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ABSTRACT

This prototypic curriculum is designed to develop awareness of the challenges man faces in his crowded communities to insure clean water, pest control, waste removal, safe food handling and adequate community health facilities. It distinguishes between the prevention of future environmental abuse and compensation for past abuses. Both the gaining of factual knowledge and the elicitation of a personal commitment by the pupil for working against environmental threats are among the purposes of the curriculum. The format is divided as follows: (1) major understandings and fundamental concepts, (2) suggested teaching aids and learning activities, and (3) supplementary information for teachers.

(Author/TL)

ED049478

PROTOTYPE
CURRICULUM MATERIALS
FOR THE ELEMENTARY
AND SECONDARY GRADES



N-SG

CG

HEALTH

GRADES 4-6

STRAND IV ENVIRONMENTAL AND COMMUNITY HEALTH
ENVIRONMENTAL AND PUBLIC HEALTH

SPECIAL EDITION FOR EVALUATION AND DISCUSSION

THE UNIVERSITY OF THE STATE OF NEW YORK / THE STATE EDUCATION DEPARTMENT
BUREAU OF ELEMENTARY CURRICULUM DEVELOPMENT / ALBANY, NEW YORK 12224 / 1970

CG 006 282

ED049478

STRAND IV

ENVIRONMENTAL AND COMMUNITY HEALTH

Grades 4-6

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STRAND IV

ENVIRONMENTAL AND COMMUNITY HEALTH

Environmental and Public Health-

Grades 4, 5, 6

OUTCOMES

pils in grades 4, 5, and 6 should:

- . realize man is an integral part of his environment
- . recognize that man has the ability to preserve earth's beauty and benefits through effective planning and appropriate action
- . understand that contamination of the environment through abuse is a threat to man's health and future existence
- . become cognizant of the finite resources in the environment which require individuals and communities to handle with care their water sources, food sources, air supply, and waste disposal
- . gain knowledge of the disease-causing organisms and pests which are dangerous to man
- . become aware of the health agencies, health services, and environmental programs available to the individual and his community to maintain and improve the environment
- . contribute to the maintenance of a healthful environment by developing a sense of responsibility for his own and the community's health
- . recognize that responsible action involves individual care, participation in interested citizen's groups, and cooperation with governmental programs and agencies.

STRAND IV

ENVIRONMENTAL AND COMMUNITY HEALTH

Environmental and Public Health

Overview

Grades 4, 5, 6

In the middle years of childhood, natural curiosity matures into observation and discovery. A child at this juncture seeks to understand the environment which is coming into sharp focus. He needs a knowledge of the factors which sustain personal health and preserve the beauty, comfort, and effectiveness of the environment. He also needs to become aware of the activities by which man threatens his environment.

The pupil needs to become aware of the challenges man faces in his crowded communities to insure clean water, pest control, waste removal, safe food handling and adequate community health facilities. The child needs also to distinguish between the prevention of future environmental abuse and compensation for abuse of the past through repairing and restoring damaged resources.

It is the purpose of this strand to make gaining factual knowledge only a first step for the pupil. The second step is a personal commitment by the pupil for responsible participation in community and governmental programs dedicated to eliminating threats to the environment. In fulfilling this participation, the child will be further committed to attain personal habits which demonstrate respect for man's dependence on his environment.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
I. The Environment and Health Status	Man is in constant inter- action with his environ- ment which is capable of improving his health or harming it.	Present a classroom prob- lem children must solve, such as: the classroom is too warm. Call on children to work through a solution in steps:
A. Explanation of the relationship between man, environment, and health	Man improves his health status when he under- stands his environment and uses it wisely.	-What is causing it? -What can cool the room? -By using the window pole (latch, transom, etc.) the teacher will alter the condition which is creating discomfort.
B. History of environ- mental control	We must constantly adapt to environmental condi- tions because our en- vironment constantly changes.	Divide the class into two groups. Have one group state a classroom problem. Second group is to work through solution to prob- lem in steps.
	Many of the devices we have created to improve our way of life have resulted in environmental destruction.	Have children identify the luxuries in our environ- ment which are resulting in unhealthy conditions.
	Individually and col- lectively man has tried to control the environ- ment in order to pro- mote healthful conditions.	Place a list on the board or construct a chart of things man can do alone and in groups to gain good health.
		Call on pupils to describe how health status is af- fected adversely or bene- ficially by:

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Man is in constant interaction with his environment which is capable of improving his health or harming it.

Man improves his health status when he understands his environment and uses it wisely.

We must constantly adapt to environmental conditions because our environment constantly changes.

Many of the devices we have created to improve our way of life have resulted in environmental destruction.

Individually and collectively man has tried to control the environment in order to promote healthful conditions.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Present a classroom problem children must solve, such as: the classroom is too warm. Call on children to work through a solution in steps:

- What is causing it?
- What can cool the room?
- By using the window pole (latch, transom, etc.) the teacher will alter the condition which is creating discomfort.

Divide the class into two groups. Have one group state a classroom problem. Second group is to work through solution to problem in steps.

Have children identify the luxuries in our environment which are resulting in unhealthy conditions.

Place a list on the board or construct a chart of things man can do alone and in groups to gain good health.

Call on pupils to describe how health status is affected adversely or beneficially by:

SUPPLEMENTARY INFORMATION FOR TEACHERS

Environment is the surroundings, conditions and influences which may affect physical development or growth of character.

Man needs to understand his natural environment in relation to:

- weather factors (sun, rain, snow, wind)
- auditory factors (industrial, occupational, residential)
- health factors (vision, odor, disease)

Among the ways man can improve his health are:

- disease control
- proper housing
- safe water supplies
- use of safely preserved and prepared food.

As an individual, man made clothing, grew and hunted food, and built shelters.

Collectively, man joined together to construct water supply facilities, build communal shelter, and share and/or exchange food supplies.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- climate
- geography
- communal living (family,
town).

1. Past

How well men care for themselves and their communities depends on the influences of the past and the geographic area in which they live.

Ask pupils to write a short paper describing the work of a famous scientist:

- what affect his work has upon control of the environment
- how health status has been advanced because of his work.

Write an essay or short play describing a day in the life of a pioneer family whose child has a high fever.

Ask pupils to select an item or health facility in a home (faucet). Trace the development of this item through the different period of history being studied. Illustrate this development through a series of pictures showing the use of this item or facility in the home.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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SUPPLEMENTARY INFORMATION FOR TEACHERS

Children need to realize that in the search for solutions to some environmental problems we have created hazardous conditions, such as the development of DDT.

Knowledge of health care was pioneered by such people as:

- Hippocrates
 - William Harvey
 - Anton von Leeuwenhoek
 - Edward Jenner
 - Florence Nightingale
 - Louis Pasteur
 - Joseph Lister
 - Pierre Curie and Marie Curie
 - Alexander Fleming
 - Jonas Salk
 - Christian Barnard
- (See appendix for description of their contributions.)

Communicable disease declined when man's knowledge increased influencing him to remove refuse, use safe water, refrigerate his food, and immunize against disease.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
	Civilizations have advanced the most during periods in their history when they have achieved some control over the environment resulting in more healthful conditions and greater comfort.	As a culminating activity, this series of pictures could be utilized in a mural, time line illustration, or collage. This activity can be done on an individual, small, or large group basis.
2. Present	New environmental hazards are created as man learns to control others.	Discuss with children the means by which man pollutes his environment. What steps are being taken to stop this destruction?
II. Man's Environment and Disease	A microorganism is any plant or animal that is too small to be seen by the unaided eye. Many microorganisms are present in man's environment, some of which are harmful to man's health.	Have children bring small jars of pond water collected from several places in the pond. Look at a few drops under a microscope. These microorganisms are generally one-celled animals called protozoa.
A. Explanation of the relationship		

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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animals called protozoa.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Man's health status is de-
termined by his ability to:
-protect himself from the
natural elements, micro-
organisms, and certain
insects
-produce food
-raise livestock
-secure an adequate supply
of usable water
-dispose of waste products
safely.

The major environmental
health hazards which are now
present are the results of
man's activities (air and
water pollution).

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

Mount enlarged pictures of drawings of microorganisms which cause disease. the students label the pictures with the names of organisms shown.

Expose a moist piece of bread to the air for about an hour; divide into four pieces and put in separate Petri dishes. Keep dishes in a dark place for a few days or a week. The common mold, *Rhizopus*, will develop. Place a small portion of the mold on a microscope slide and let the class observe.

Have children bring newspaper or magazine clippings which deal with news of preventing disease. Group the articles on a bulletin board under the following titles as:

"Infectious" and "Non-infectious."

Have children write sentences using the following words:

-protozoa -disease
-mold -environment
-bacteria -microorganisms

OR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Mount enlarged pictures or drawings of microorganisms which cause disease. Let the students label the pictures with the names of organisms shown.

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SUPPLEMENTARY INFORMATION FOR TEACHERS

Disease is any adverse change from the normal condition or functioning of the body.

Four microorganisms that cause disease are protozoa, bacteria, fungi and virus.

Some diseases caused by:

-protozoa
 .malaria
 .amebic dysentery
 .sleeping sickness
-bacteria
 .diphtheria
 .tuberculosis
 .typhoid
 .tetanus
 .anthrax
-fungi
 .ringworm
 .athlete's feet
-virus
 .polio
 .measles
 .mumps
 .smallpox

Additional information on disease can be found in Strand I, Disease Prevention and Control, Grades 4-6.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
B. History of relationship	Man has controlled disease producing micro-organisms to some extent by such measures as sanitation, improved sewage treatment, immunization, and the improvement of safe water systems.	Have a class committee find out if the community uses ground water. Find out from the company the pumping stations and why they are located at these particular places. Have pupils recall their own vaccination against smallpox. They may remember that they were given deeper injections of toxoid for diphtheria and tetanus. Lead pupils to discuss ways in which they personally guard against contracting disease. Discuss such terms as -immunity (natural and acquired) -vaccination and/or inoculation -immunization -filtration -toxins. Have children use the words in written material to indicate their knowledge of the term and proper usage.

OR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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-vaccination and/or inoculation
-immunization
-filtration
-toxins.

Have children use these words in written material to indicate their knowledge of the term and its proper usage.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Immunity is the ability of the body to resist the invasion of germs and to prevent the development of a disease. Acquired immunity is temporary or permanent, depending on how it is acquired and the specific disease against which it protects.

Active immunity is brought about in two ways. One way is by recovering from the disease process itself. A second way is by injecting the germ itself (in a dead or weakened state) or by injecting the weakened waste product of the germ. Injections of a killed or live germ are known as vaccines. Injection of the waste product itself is called a toxoid.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Have pupils prepare a list of common disinfectants used to kill microorganisms that are commonly found at home and in the school.

Conduct the following experiment to show how disinfectants work:

Equipment: alcohol, Lysol iodine, dried beans, 4 test tubes, sterile absorbent cotton.

Process: (a) soak the beans in cold water, (b) number the test tubes, (c) put several beans in each test tube and cover beans with water, (d) do not add anything to test tube 1, (e) add a little iodine to test tube 2, (f) add a little Lysol to test tube 3, (g) add a little alcohol to test tube 4, (h) stopper all the test tubes with cotton and put them in a warm place for 2 days.

Follow-up: (1) remove the cotton and smell the contents of the test tubes.

Discuss: Do any of the test tubes have an odor?

UNDERSTANDINGS AND
MENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

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Follow-up: (1) remove the cotton and smell the contents of the test tubes.

Discuss: Do any of the test tubes have an odor?

Note: In the experiment on disinfectants, let the pupils get used to the odor of iodine, Lysol, and alcohol if they are not already familiar with these chemicals. When the pupils test the results of the experiment, there may be a trace of the odor of these substances in the tubes. The class will easily identify the odor of decay in test tube 1. As a check on the experiment, let them compare a test tube of boiled water, left stoppered and standing for several hours, with test tube 1. There will be no odor from the boiled water.

(From: Science for Tomorrow's World. The Macmillan Series - Grade 5. Macmillan Company, New York)

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
III. Water A. Need for water	Water is a vital part of all living things.	What does the presence of an odor indicate? Can you make certain microorganisms cause odor? Perform the following experiment which shows that water makes up a large portion of food (living things). <u>Material needed:</u> a knife, sliding scale plastic bag, paper <u>Process:</u> (1) weigh apple (suspend in p bag), (2) enter the in a notebook, (3) c apple into small pi on the paper towel sunlight and leave for several days, (4 weigh the pieces of and enter the weigh calculate the weigh water lost by the a Weight of apple ____ Weight of apple afte drying ____ Weight lost by appl Weight of water in
1. Sources of water	The water cycle is unchang- ing. It is a constant, re- supplying source of water.	Discuss the question "Why is the water n used up?" Make a mural showing entire water cycle.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Water is a vital part
of all living things.

The water cycle is unchang-
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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

What does the presence of
an odor indicate? How
can you make certain that
microorganisms caused the
odor?

Perform the following ex-
periment which shows
water makes up a large
portion of food (living
things).

Material needed: apple,
knife, sliding scale,
plastic bag, paper towel

Process: (1) weight the
apple (suspend in plastic
bag), (2) enter the weight
in a notebook, (3) cut the
apple into small pieces
on the paper towel in the
sunlight and leave there
for several days, (4)
weigh the pieces of apple
and enter the weight, (5)
calculate the weight of
water lost by the apple.
Weight of apple _____ .
Weight of apple after
drying _____ .
Weight lost by apple _____.
Weight of water in apple
_____ .

Discuss the question:
"Why is the water not
used up?"

Make a mural showing the
entire water cycle.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Water is needed by living
things in order for them
to carry on the complex
activities of life. Most
tissues of organisms are
made of 70 to 95 percent
water.

The constant changing of
water from liquid to vapor
and then back to liquid
again is called the water
cycle. The two forces that
furnish the energy for the

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

Make a simple terrarium with small plants. water and placing a cover over the top, the water cycle will be demonstrated on a small scale. A gallon mayonnaise jar makes a good terrarium.

Communities obtain their water supply from ground and surface water sources. These sources are sustained by rain and snow.

Have a child write to the water company or the water supply department of the city government to ascertain the sources of the community water. Locate these areas on a map.

Obtain a map of the New York City reservoir system. Discuss the meaning of the word "reservoir" and "water" and how they relate to water sources.

Draw a mural depicting the water table.

On a sand table, make a model of a reservoir and its watershed. Show the hills, valleys, streams, and the reservoir.

2. Uses of water

A dependable water source is essential to public health, safety, and recreation.

Have pupils make a list of all the ways in which they use water for a four-hour period. Have

UNDERSTANDINGS AND
MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS
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Draw a mural depicting the water table.

On a sand table, make a model of a reservoir and its watershed. Show the hills, valleys, streams, and the reservoir.

Have pupils make a list of all the ways in which they use water for a 24-hour period. Have pupils

SUPPLEMENTARY INFORMATION
FOR TEACHERS

cycle are the sun and gravity. The sun warms the water, giving energy for evaporation. Gravity pulls the water droplets back to earth.

Nationwide, about 80 percent of the water supply comes from surface sources and 20 percent from ground water.

A watershed is an area that collects and drains off water to a collection center, such as a stream, a lake, or an ocean.

The amount of water we use depends on:
-the amount of water available

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

compare their completed list and ascertain the most common use of water listed.

Have a committee decide and report:

- how much the population in the community has increased since 1900
- the amount of water needed daily in the community in 1900 as compared to the amount of water needed today. A chart may be made of the findings.

Have children make a circle graph showing the way water is used by each person (information given under supplementary information for teaching).

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

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Have a committee decide and report:

- how much the population in the community has increased since 1900.
- the amount of water needed daily in the community in 1900 as compared to the amount of water needed today. A chart may be made of the findings.

Have children make a circle graph showing the way water is used by one person (information is given under supplementary information for teachers).

SUPPLEMENTARY INFORMATION
FOR TEACHERS

- the number of modern conveniences we own and how much we use them
- how many people use the supply.

Some home uses of water and the average amounts used are:

- shower - 25 to 30 gallons per use
- bath tub - 12 to 30 gallons per use
- washing machine - 25 to 50 gallons per load
- cooking and drinking - 5 gallons per day
- dishwasher - 9 1/2 to 15 1/2 gallons per load

To meet all the needs of an average community, 140 gallons of water must be supplied every day for every person living in the community. Of the 140 gallons, 50 gallons are used in the home. An additional 50 gallons are used by industry. Water needed for firefighting, street sprinkling, swimming pools, and public fountains accounts for another 10 gallons. Businesses use 20 gallons for the operation of stores and offices. Ten gallons

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITY
B. Management for clean water	Man must protect his limited sources of water.	Discuss such ques -What are the thre drains on the wa supply? -Why does man nee tect water sourc about 70 percent earth is compose water?
1. Methods of management	Man has numerous methods of purifying water.	Make a model of a purifying plant. <u>Needed:</u> funnel, s cotton, about a ha inch of garden soi quart jar, another quart jar. <u>Process:</u> Add about quart of water to with the soil in i shake it up so tha water is full of s Let the water stan awhile. Discuss v pupils what happen the water as the p settle to the bott Place some cotton funnel. Put a lay sand about an inch over the cotton. funnel in the clea

UNDERSTANDINGS AND MENTAL CONCEPTS

st protect his
d sources of water.

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Discuss such questions as:

- What are the three major drains on the water supply?
- Why does man need to protect water sources if about 70 percent of the earth is composed of water?

Make a model of a water-purifying plant.

Needed: funnel, sand, cotton, about a half an inch of garden soil in a quart jar, another clean quart jar.

Process: Add about a quart of water to the jar with the soil in it, and shake it up so that the water is full of soil. Let the water stand for awhile. Discuss with pupils what happens to the water as the particles settle to the bottom. Place some cotton in the funnel. Put a layer of sand about an inch deep over the cotton. Put the funnel in the clean jar.

SUPPLEMENTARY INFORMATION FOR TEACHERS

are lost through leaks and breaks in underground pipes.

Proper management of present water sources is imperative because:

- pure water resources are not inexhaustible
- protection is less costly than attempting to reclaim polluted water
- greater demands are made on the present water resources as the population expands.

The use of modern technological processes helps to free the environment from harmful microorganisms. These processes include the use of settling tanks and filtration systems and the addition of chemicals to the water.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Gently pour some water from the settling jar to the funnel. Discuss with pupils what happens to the water in the funnel. (From: Concept in Science Grade 4. Harcourt Brace and World, New York)

Discuss with children following:

- Filtration often does remove harmful bacteria from water. Why?
- In what ways can bacteria be destroyed?
- What would be effective in a large reservoir?

Perform the following experiment:

Needed: microscope, a culture of some microorganisms, chlorine bleach, medicine dropper, microscope slides.

Process: Prepare a culture of microorganisms. Obtain a pint jar of pond water. Crumble a piece of egg yolk (about the size of a pea) from a hard-cooked egg into the jar of pond water. Keep the jar away from the sun, but in a warm place. After a few days, the culture should

UNDERSTANDINGS AND
MENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

Gently pour some water from the settling jar into the funnel. Discuss with pupils what happens to the water in the funnel. (From: Concepts in Science Grade 4. Harcourt Brace and World. New York)

Discuss with children the following:

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REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

swarm with microorganisms.
Examine samples of water
culture under the microscope
until you find a drop
containing a large number
of living microorganisms.
As you watch them move
under the scope, add a
drop of liquid iodine to
the water on the slide.
Discuss with pupils the
effect of the iodine.
How long does it take
bleach to kill micro-
organisms? Investigate
further how much iodine
is really necessary to
kill the bacteria in a
drop of water.
(From: Conceptual
Science Grade 5
text, Brace and
New York)

2. Role of government

All levels of govern-
ment must be active in
the protection of water
resources.

Using a map of the
States, locate the
bodies of water
are common to several
communities, states,
nations. Discuss the
importance of cooperation
among all groups.

a. National

Laws have been passed
by the National Govern-
ment to protect water
resources.

Discuss the food
with the class.
-Why is it necessary
have national laws
the protection of
resources?

UNDERSTANDINGS AND MENTAL CONCEPTS

levels of govern-
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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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Examine samples of the
culture under the micro-
scope until you find one
containing a large number
of living microorganisms.
As you watch them moving
under the scope, add a
drop of liquid bleach to
the water on the slide.
Discuss with pupils:
How long does it take the
bleach to kill all the
organisms? Investigate
further how much bleach
is really necessary to
kill the bacteria in a
drop of water.

(From: Concepts in
Science Grade 6, Har-
court, Brace and World.
New York)

Using a map of the United
States, locate large
bodies of water which
are common to several
communities, states, or
nations. Discuss the im-
portance of cooperation
among all groups involved.

Discuss the following
with the class:
-Why is it necessary to
have national laws for
the protection of water
resources?

SUPPLEMENTARY INFORMATION FOR TEACHERS

Large bodies of water such
as the Great Lakes and the
coastal waters of the
United States are common
to many areas, thereby re-
quiring broad governmental
jurisdiction.

Key dates relating to
national laws:
-1899 Rivers and Harbor Act
prohibited discharge of
refuse into navigable
water unless in liquid
state.

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

-How are these laws helpful?

-Should only the National Government be concerned with the protection of water resources? If not who else should be involved?

b. State

New York State plays an important role in the management of water resources.

Have a class committee write to various State agencies asking for materials concerning water resources and their management.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- How are these laws helpful?
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SUPPLEMENTARY INFORMATION FOR TEACHERS

- 1912 Public Health Service Act authorizing an investigation of diseases spread by pollution of navigable lakes and streams.
- 1924 Oil Pollution Act prohibited damaging amounts of discharge of oils into coastal waters.
- 1948 Federal Water Pollution Control Act (made permanent in 1956) provided money for research and construction of waste treatment plants.
- 1965 Water Quality Act enlisted aid of the states to:
 - .set water quality standards for all interstate and coastal waters, and
 - .established a Federal Water Control Administration which (since 1966) is in the Dept. of the Interior).

The following agencies are active in the protection of water resources:

- The New York State Environment Board. This agency helps communities in programs of water development, management, and utilization.

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

c. Local

Local governments are
active in clean water
management.

Have class make a visit
to a water purification
plant to see filtration
and treatment of water.

C. Pollution of water

1. Definition of
water pollution

Polluted water is water
which contains harmful
substances in quantities
which endanger health
and limit its use.

Collect and display pic-
tures and articles about
polluted water.

DERSTANDINGS AND
TAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

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ces in quantities
ndanger health
it its use.

Collect and display pic-
tures and articles about
polluted water.

- Department of Environ-
mental Conservation.
This Department was em-
powered under Pure Water
Bond Act of 1965. It
conducts state wide,
intermunicipal water
pollution prevention and
abatement programs, con-
ducts water planning pro-
grams, and sets standards
and supervises public
water supplies.
- New York State Conserva-
tion Department.
- Interstate Sanitation
Commission.
- Local health departments
operate under Public
Health Law Article 12.
They supervise and regu-
late sanitary aspects of
public water sources and
enforce the state sani-
tation code at the local
level.
- County Department of
Public Works.
- Special Districts.

Pollutants may be organic
or inorganic. Examples of
undesirable pollutants are:

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

2. Cause of water pollution

Water pollution has many causes, most of which are the results of man's carelessness and abuse.

Have a class committee research and report on cause of water pollution and the source of the information (radio, TV, etc.)

a. Communities

The extensive use of detergents and the lack of adequate sewage treatment facilities in many communities is a contributing factor in water pollution.

Have a class committee find out how sewage is treated in the community. Find the answers to such questions as:
-What is done with the heavy sewage?
-Where is the liquid sewage released after treatment?

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Water pollution has many causes, most of which are the results of man's carelessness and abuse.

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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-What is done with the heavy sewage?
-Where is the liquid sewage released after treatment?

SUPPLEMENTARY INFORMATION FOR TEACHERS

- domestic wastes
 - .human wastes
 - .detergents
 - .household greases
- industrial and commercial wastes
 - .grit chemicals
 - .alkalies
 - .dyes
 - .lubricants
 - .metals
- agricultural wastes
 - .silt
 - .nitrates
 - .fertilizers
 - .pesticides
 - .insecticides
 - .herbicides
 - .animal wastes

Some of the factors contributing to water pollution:

- growth in population, industry, cities
- increased demand for water due to the growth in population, industry, and cities
- rapid technological expansion in the use of chemicals
- inadequate and outdated treatment facilities
- man's attitude.

Water affected by pollution may be identified by these visible characteristics:

- scum on top
- odor
- floating and submerged trash

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
b. Industries	The industrial use of water is a major cause of pollution.	Have a child write a letter to the New York State Office of General Services, Department for the Environment, concerning detergents. Have a committee prepare a detergent advertisement. Make a bulletin board display using the information obtained from the least to the worst pollution offenders. Discuss with pupils the implications of the following statement: "Most organisms in water need oxygen in amounts for their survival. The amount of dissolved oxygen that water can hold depends on the temperature of the water." Ask: -Would you be more likely to find brook trout in a mountain stream or in streams near large cities? -Can more waste be decomposed in water or in air?
c. Improper use of land areas through highway construction, farming, forestry	Soil cover removal causes erosion and siltation of streams.	Have children do the following experiment on erosion: <u>Process:</u> Get a box and remove the soil from the top.

UNDERSTANDINGS AND MENTAL CONCEPTS

Industrial use of
water is a major cause
of pollution.

Ground cover removal causes
erosion and siltation of
streams.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Have a child write to the New York State Conservation Department for materials concerning detergents. Have a committee collect detergent advertising. Make a bulletin board display using the information obtained from the least to the worst pollution offenders.

Discuss with pupils the implications of the following statement:
"Most organisms living in water need oxygen in varying amounts for breathing. The amount of dissolved oxygen that water can hold depends on the temperature of the water."

Ask:

- Would you be more apt to find brook trout in mountain streams or in streams near large cities?
- Can more waste materials be decomposed in warm water or in cool water?

Have children do the following experiment on soil erosion:

Process: Get a wooden box and remove one end.

SUPPLEMENTARY INFORMATION FOR TEACHERS

- gas bubbles
- types of life in bottom (benthos).

Industries use vast amounts of water in making their products. Water is used for processing and cooling purposes, and the heated water is then returned to the streams.

The warmer water becomes, the less oxygen it is able to hold. When water is 34°F., it can hold 14.2 ppm (parts per million) of dissolved oxygen. When water is 79°F., it can hold 8.2 ppm of dissolved oxygen. As the amount of pollution increases in a stream, more dissolved oxygen is needed to decompose the waste.

Rain washes soil off land that has had trees and ground cover plants removed through such activities as highway construction, improper farming, and forestry.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
3. Effects of pollution	Water pollution affects man and his environment in many ways. It af- fects health, natural beauty, recreation, and property values.	Replace this end with w screening. Shape a fun- nel-type pathway out of aluminum foil and fasten it to the open end of th box. Fill the box with soil, and place it on a slant above a large wide mouthed jar. Sprinkle water on the soil. The water will run out throu the screening and fall to the jar. Discuss: -How much soil does it carry along with it? -What could you do to reduce the erosion? Have pupils create stor skits, poems, songs, wh tell of a child or an a imal whose environmental water became polluted. Take a field trip to an area blighted by water pollution. Discuss: -What is the cause of t pollution? -What is being done to restore the area? Discuss with class: -Why we need beauty in our natural surroundin

OR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

er pollution affects
and his environment
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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Replace this end with wire screening. Shape a funnel-type pathway out of aluminum foil and fasten it to the open end of the box. Fill the box with soil, and place it on a slant above a large wide-mouthed jar. Sprinkle water on the soil. The water will run out through the screening and fall into the jar.

Discuss:

- How much soil does it carry along with it?
- What could you do to reduce the erosion?

Have pupils create stories, skits, poems, songs, which tell of a child or an animal whose environmental water became polluted.

Take a field trip to an area blighted by water pollution.

Discuss:

- What is the cause of the pollution?
- What is being done to restore the area?

Discuss with class:

- Why we need beauty in our natural surroundings?

SUPPLEMENTARY INFORMATION FOR TEACHERS

Water borne diseases include:

- hepatitis
- typhoid fever
- dysentery
- cholera
- gastroenteritis

Other consequences of water pollution are:

- diminishes sources of water supply
- increases cost of necessary treatment of public water supply
- discourages industrial expansion (which may result in lower employment, underdeveloped towns, and lowered state revenues)

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

-How water enriches
lives?

Have children draw
"before" and "after"
pollution picture.

This section is basically for use at the intermediate
level due to the technical aspects of the information.

IV. Air

A. Composition of air

Air is composed of gases--
mainly nitrogen, oxygen,
and carbon dioxide.
The composition of air
determines its useful-
ness in maintaining plant
and animal life.

To demonstrate that
air is composed of more
than one gas, remove oxygen
from a sample of air and
show that about four-fifths
of the air still remains.
Process:

Wash a wad of steel wool
in detergent to remove
the oil which was present
on it to prevent rusting.
Push this wad of wool into
the bottom of a test tube.
Invert the test tube in a
pan of water and have
children observe it occa-
sionally for the next
few days. As the oxygen
begins to combine with
the steel wool to form iron

UNDERSTANDINGS AND MENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION FOR TEACHERS

-How water enriches our
lives?

Have children draw a
"before" and "after" pol-
lution picture.

-destroys water recreation
(boating, fishing, swim-
ming)

-lowers water frontage and
property values

-robs areas of their natu-
ral beauty

-destroys wildlife (fish,
plant life, bird and
water animals).

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MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

B. Need for air

All living things require a constant supply of oxygen varying in amounts according to body size, physical activity, and basic rate of metabolism. Green plants require certain amounts of carbon dioxide to carry on the food making process of photosynthesis.

rust, the water will rise in the test tube to take its place. After the water has risen about one-fifth of the way up the tube, no further change will occur, because the oxygen will have been exhausted, leaving only the other gases which are in the air.

Determine, with the class the individual amount of air needed to meet daily requirements. (See supplementary information)

Assume that the average person inhales approximately 8 liters of air per minute. A liter is a measure of volume that is just slightly larger than one quart. If each liter of air weighs about 1.2 grams, what is the weight of air inhaled in one minute? Determine the volume and then the weight of air that would be inhaled in a 24 hour period. If one pound is equal to 454 grams, how many pounds of air does the

UNDERSTANDINGS AND
MENTAL CONCEPTS

Living things require
constant supply of
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Land plants require
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SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

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a 24 hour period.
If one pound is equal to
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SUPPLEMENTARY INFORMATION
FOR TEACHERS

Not all the air taken in
by an organism is used to
maintain life. Only a
small amount is used for
this purpose. The re-
maining air that leaves
an organism is different
from the air that enters
it. The composition of
the air changes in accord-
ance with the kind of
metabolic activities
carried on by the organism.
(Metabolism is the group
of chemical reactions that
take place in an organism.)

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
		average person inhale each day? (From: Science Through Discovery, Grade 6. L. W. Singer Company, Inc. New York)
C. Pollution of air		
1. Definition of air pollution	Polluted air is air which contains harmful sub- stances in quantities which endanger health and limit its use.	
2. Causes of air pollution	There are two common causes of air pollution: burning, which releases solid particles and gases into the air, and other industrial pro- cesses which fill the atmosphere with a great variety of materials.	Obtain a map of the com- munity. Discuss with the class the possible sources of air pollution in the community (industry, etc.) Show the location (in gen- eral) of the sources of air pollution on the map.

UNDERSTANDINGS AND
TAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

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munity. Discuss with the
class the possible sources
of air pollution in the
community (industry, etc.).
Show the location (in gen-
eral) of the sources of
air pollution on the map.

Substances that pollute or
contaminate the air are
called pollutants. Most
pollutants are formed by
the incomplete burning of
fuels or are the dust and
chemical by-products re-
leased during industrial
operations.

Pollutants may be classi-
fied into three categories:
-Gases - sulfur dioxide,
hydrogen sulfide,
nitrogen dioxide,
and many others.
-Liquids and aerosols -
finely divided
particles and fumes
of many substances.
-Solids - dust, metal parti-
cles, ashes, etc.

When small particles are
suspended in a gaseous
medium such as air, the
mixture that results is
called an aerosol.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
a. Residential	Trash and leaf burning by the individual or community create prob- lems of air pollution.	Have a class committee determine if there are ordinances prohibiting the burning of trash and or leaves. If there are such ordinances, discuss with the class how they are being enforced.
b. Industrial	The release of pollutants into the air by industry is a major problem. The most important chemical change that produces air pollutants is the burn- ing of combustible materials.	The smoke that is pro- duced when coal and other fuel burns is an aerosol containing carbon parti- cles. These carbon par- ticles are called soot. Soot often collects on surfaces as a black de- posit. Perform the following experiment: Process: -Obtain a candle, match, an alcohol lamp, three clean test tubes of the same size, a test tube holder, and a test tube rack. -Hold test tube 1 in the flame of a candle for 10 seconds. Place it in the test tube rack. -Hold test tube 2 in the flame of a match for 10 seconds. Place in rack. -Hold test tube 3 in the

UNDERSTANDINGS AND MENTAL CONCEPTS

and leaf burning
individual or
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Release of pollutants
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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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duced when coal and other
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Perform the following
experiment:

Process:

- Obtain a candle, matches,
an alcohol lamp, three
clean test tubes of the
same size, a test tube
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- Hold test tube 1 in the
flame of a candle for
10 seconds. Place it
in the test tube rack.
- Hold test tube 2 in the
flame of a match for 10
seconds. Place in rack.
- Hold test tube 3 in the

SUPPLEMENTARY INFORMATION FOR TEACHERS

Most combustible materials
are composed chiefly of
carbon and of compounds
containing carbon, hydrogen,
and oxygen. Many combusti-
ble materials also contain
small amounts of additional
elements such as sulfur,
nitrogen, and phosphorus.
Compounds containing these
elements are released into
the air when combustion
takes place.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

c. Automotive

The burning of gasoline and diesel fuel adds pollutants to the air. The exhaust fumes from a gasoline or a diesel engine usually contain a high concentration of carbon monoxide.

flame of the alcohol burner for 10 seconds. Place in rack.

-When the test tubes cooled, examine the soot deposit.

-Which produced the soot?

.the flame of the

.the flame of the

.the flame of an alcohol burner

Discuss with children answers to the following questions:

-How much carbon monoxide is produced by a community in which there are 10,000 cars?

-Suppose each of the 10,000 cars travels 20 miles per day.

How many pounds of carbon monoxide are discharged into the air each day?

-If a pound of carbon monoxide occupies a volume of 14 cubic feet, how many cubic feet of this gas are discharged into the air each day?

-If the distance each car travels is increased to 100 miles per day, what effect would this have on the amount of carbon monoxide that is released?

UNDERSTANDINGS AND CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

flame of the alcohol
burner for 10 seconds.
Place in rack.

-When the test tubes have
cooled, examine them for
soot deposit.

-Which produced the most
soot?

- .the flame of the candle
- .the flame of the match
- .the flame of an alcohol
burner

Discuss with children the
answers to the following
questions:

-How much carbon monoxide
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travels is increased to
100 miles per day, what
effect would this have
on the amount of carbon
monoxide that is released?

SUPPLEMENTARY INFORMATION FOR TEACHERS

A moving automobile dis-
charges exhaust fumes con-
taining about 2 1/2 pounds
of carbon monoxide for
every 20 miles that it
travels.

Seven percent of the fuel
used in an automobile
emerges as unburned hydro-
carbons.

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

d. Natural

The air may become polluted by natural events such as dust storms, volcanic eruptions, and forest fires.

Have class committees research and report on forest fires or volcanic eruptions. Consider their effects on the air. Pictures of such events may be collected for a bulletin board display.

e. Atmospheric
conditions

Conditions that produce changes in the speed and direction of the wind indirectly affect the dispersal of pollutants in the air.

Discuss such questions as:
-How can the temperature of air affect the dispersal of pollutants?
-How does the weather condition known as an

UNDERSTANDINGS AND TAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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SUPPLEMENTARY INFORMATION FOR TEACHERS

Fine dust from violent
volcanic eruptions has
been known to be carried
around the earth by air
currents. Some years ago,
smoke from a large forest
fire in North America was
later detected in several
countries of northern
Europe.

During the 1930's, several
years of drought created
a dust bowl area in mid-
western United States.
Dust from the drought-
stricken states was car-
ried by the wind to some
cities located as far away
as the Atlantic coast.
(From: Science Through
Discovery, Grade 6, L. W.
Singer Company, Inc.,
New York)

Weather factors that in-
fluence the wind are tem-
perature, barometric pres-
sure, amount of sunlight,
and precipitation. The
topography of the region,

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

"inversion" occur?

-How does an inversion condition affect air pollution?

-What affect does precipitation have on pollution?

-How does the topography of the land affect air pollution?

Perform the following experiment to demonstrate an "inversion."

-Take a tall, narrow container, such as an olive jar, and fill it half full of motor oil. Introduce water through a tube on the surface of the oil. If this is done carefully, it may be possible to fill the cylinder to the top.

Normally the water would be below the motor oil. In a like manner, warm air should be found nearer the ground than cold air. However, under certain conditions there is an "inversion" of normal affairs and the cold air, like the water, is found on top.

ERSTANDINGS AND
AL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

- "inversion" occur?
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SUPPLEMENTARY INFORMATION
FOR TEACHERS

whether it is level, hilly, or mountainous, also affects air movement.

Temperature of the air affects the dispersal of pollutants. The unequal heating of the earth's surface by the sun's rays causes the formation and movement of large masses of air. Under normal daytime conditions, the temperature of the air decreases as the altitude above the surface of the earth increases (approximately 5.4°F. for every 1000 feet). A reversal of this condition, as illustrated in the experiment, causes an "inversion" condition. The inversion will last until some change in atmospheric conditions makes it possible for the lower layer of air to move.

Precipitation in the form of rain or snow has a cleansing effect on polluted air. Suspended particles of dust and other materials are removed from the air when they collide with raindrops or snowflakes and are carried to the ground.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
3. Harmful effects of air pollution	There is an economic loss, estimated to exceed 11 billion dollars year- ly caused by damage of air pollution. In ad- dition, there are seri- ous harmful effects on the health of people.	
a. Health	Air pollutants create harmful effects to people's health.	Perform the following ex- periment to produce smog: -Smog can be produced by the condensation of water vapor (or other vapors) on solid parti- cles like smoke. -Insert a lighted match in a gallon jug to make small amount of smoke. Blow, with your mouth pressing firmly on the mouth of the jug, and re- lease the compressed air quickly. A smog should form in the jug. Try this blowing activity without the smoke from the match.
b. Agriculture	Many plants are extreme- ly sensitive to the toxic effect of some common air contaminants and may be	You can observe the ef- fect of smog, dust, and exhaust gases on plants.

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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You can observe the effect of smog, dust, and exhaust gases on plants.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Many gaseous pollutants dissolve in rain and are removed from the air.

Some contaminants are actually toxic, e.g., fluorides, hydrogen sulfides, and arsenic. Most commonly, the results are respiratory: irritation of the throat and lungs, coughing, lesions of the respiratory tract, and in severe cases, death from respiratory failure.

Some pollutants such as pollen show primarily an allergic effect. The radioactive pollutants, and a few other types may cause cancer. In the case of ionizing radiation, mutations may be found.

An important pollutant that causes damage to vegetation is sulfur dioxide. Sulfur dioxide and oxygen combine

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

eaten by animals with
fatal results.

SUGGESTED TEACHING AND LEARNING ACTIVITIES

- Compare the conditions of trees, shrubs, and other plants growing near a heavily traveled road with similar shrubs, and plants are growing some distance from the road.
 - With a hand lens, examine individual leaves from plants in both locations. Note the presence of dust particles on the surface of leaves. Which leaves have more dust on them? Why?
 - Note any differences in the size and color of leaves on the plants in both locations.
 - Give a possible explanation for any differences that you can find.
- Science Through Inquiry, Grade 6, L. W. S. Inc., New York)

Perform the following experiment: to show that pollutants may clog stomata or openings on leaves of green plants and interfere with the passage of water and other gases in and out of the leaf.

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- Compare the condition of trees, shrubs, and other plants growing near a heavily traveled road with similar trees, shrubs, and plants that are growing some distance from the road.
- With a hand lens, examine individual leaves from plants in both locations. Note the presence of dust particles on the surface of the leaves. Which leaves have more dust clinging to them? Why?
- Note any difference in the size and color of leaves on the plants in both locations.
- Give a possible explanation for any differences that you can find. (From: Science Through Discovery Grade 6, L. W. Singer Co., Inc., New York)

Perform the following experiment: to show that pollutants may clog the stomata or openings on leaves of green plants and interfere with the passage of water vapor and other gases in and out of the leaf.

SUPPLEMENTARY INFORMATION FOR TEACHERS

with water vapor in the air to form sulfuric air mist. In addition to coniferous and hardwood trees, other plants that are sensitive to sulfur dioxide include leafy vegetable crops, alfalfa, barley, wheat, oats, and trees such as aspen, poplar, and birch.

Gaseous pollutants that accumulate on the leaves of plants interfere with photosynthesis, retard growth, and cause destructive changes in the plant tissue.

Because of the accumulative nature of these poisons, the animals feeding on these plants also are poisoned. The animals develop a disease that results in decay of the teeth and gums, loss of weight, bone deformities, and eventually death.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

c. Reduced visibility

Dense layers of smoke and haze over a city may absorb as much as 90 percent of the sunlight in that area and are a frequent cause of traffic accidents.

- Select two or three leaves of a healthy geranium plant. Coat them with petroleum jelly making sure that all surfaces are covered. Observe condition of these leaves on the same plant over a period of time.
- An interesting variation of this experiment would involve coating one leaf on the bottom surface only, one leaf on the top surface only, and one leaf on both sides. What conclusions can be drawn from this experiment? (From: Air Pollution, New York State Education Dept.)

Discuss with class the following:

- How are airlines affected by excessive smoke over cities?
- Find out from the National Safety Council what hours of the day most auto accidents occur.
- Obtain a photographic light meter. Use this to show differences in light intensity on days when the air is clear and on days when there is fog or overcast.

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

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REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
D. Control of air pollution		sure to make the test at the same location the room and at the time of day.
1. Need for control	The need for control of air pollution is a national concern. At- tempts to control pol- lution of the air are really attempts to pre- vent pollutants from getting into the air in objectional amounts.	
2. Devices for control	Numerous devices for the control of air pol- lution are available for use by individuals and industry.	
a. Automotive	Devices are available that reduce to accept- able levels the pol- lutants produced by motor vehicles.	Discuss the following: If automobiles were driven by electric instead of gasoline engines, how would air pollution be affected? -How does an after- work to reduce air pollution?

UNDERSTANDINGS AND AL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION FOR TEACHERS

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Discuss the following:

If automobiles were
driven by electric motors,
instead of gasoline en-
gines, how would air pol-
lution be affected?

-How does an afterburner
work to reduce air pol-
lution?

One device for the control
of automotive pollution is
a canister containing a
special chemical. When
placed in the car's exhaust
system, the special chemi-
cal decomposes most of the
pollutants.

An afterburner consists of
a spark plug and an air
supply device which are
placed in the exhaust sys-
tem. A spark from the
spark plug helps to destroy

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
b. Industrial	Methods have been developed to control air pollution from industrial processes.	Discuss with class an industrial air pollution control system. (See supplementary information) -Have class draw an example of this system, labeling the various components (appendix)

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Methods have been developed to control air pollution from industrial processes.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Discuss with class an industrial air pollution control system. (See supplementary information)
-Have class draw an example of this system, labeling the various components (appendix)

SUPPLEMENTARY INFORMATION FOR TEACHERS

unburned fuel and other contaminants.

Methods have been developed to remove the harmful materials discharged into the air through smokestacks. This type of equipment can remove either solid or liquid particles, depending on the size and other physical properties.

-Coarse particles of ash and dust are removed by means of a settling chamber. In this chamber, the larger particles fall out of the smoke and fumes because of the influence of gravity.

-Smaller particles have to be removed by more effective equipment. In this equipment, the stream of smoke and fumes is rotated at very high speed. This causes many of the fine particles to be removed by collecting on the walls of the device. Water sprays are often used to assist in the removal of fine dust particles. Some of these particles can be collected by passing the smoke and fume stream through a filter of wool, paper, fiber glass, or some suitable material.

REFERENCE

MAJOR UNDERSTANDINGS AND
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SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

The electrostatic precipitator is used to remove aerosol particles. This device causes the aerosol particles to become electrically charged. The charged particles are then attracted toward metallic tubes that have an opposite charge. The particles collect on the outside of the tubes.

Periodically, the collected material is removed from the tube.

-Gaseous pollutants are removed by bubbling them through certain types of solution. The gas either dissolves in the solution or reacts chemically with it. Some gases are removed by passing them through porous materials such as powdered charcoal. The gas molecules are attracted to the surface of the charcoal particles. Other gases can be removed by passing them through or over solid materials which promote chemical reactions.

(From: Science Through
Discovery, Grade 6. L. W.
Singer Company, Inc.,
New York)

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
3. Measurements of pollution	Special methods have been developed to measure the amounts of different kinds of air pollutants.	
a. Ringelmann chart	The density of smoke coming from a chimney or smokestack is de- termined with the aid of a Ringelmann chart.	Have class committee esti- mate the density of smoke coming from smokestacks or chimneys in the area. Compare with the Ringel- mann chart.

FOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Have class committee esti-
mate the density of smoke
coming from smokestacks
or chimneys in the area.
Compare with the Ringel-
mann chart.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Write to Mr. Harry Hovey,
Division of Air Resources,
New York State Dept. of
Environmental Conservation,
50 Wolfe Road, Albany, New
York 12201; for a sample
Ringelmann chart.

A Ringelmann chart consists
of a series of grids com-
posed of black lines ruled
on a white background. When
viewed at arm's length, the
grids appear as graduated
shades of gray that vary
between all white and all
black. Each shade of gray
represents a certain smoke
density. By matching as
closely as possible the
shade of smoke to the shades
of gray on the Ringelmann
chart, it is possible to
estimate the density of the
smoke. The lightest shade
of gray represents 20 per-
cent density; second gray-
est, 40 percent; third gray-
est, 60 percent; and darkest
gray, 80 percent.

Air pollution control agencies
consider a smoke density of
no more than 20 percent to
be permissible. (From Sci-
ence Through Discovery,
Grade 6. L. W. Singer
Company, Inc. New York)

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
b. Dustfall	Dustfall measurement determines the amount of soot, dust, and other particles that settle out of the air.	Perform the following experiment to find out which has more dustfall - the air in the classroom or the air outside of the school: <u>Equipment needed:</u> 2 glass plates (same size), petroleum jelly, microscope, or hand lens. <u>Process:</u> -Evenly cover one side of each glass plate with a layer of petroleum jelly. -Put one of the glass plates on an outside window ledge and the other glass plate in the room where it will not be disturbed. -After one day's exposure, examine the deposit of dustfall on each glass plate with a microscope or hand lens. Note the size, color, and shape of the particles. -Compare the amount of dustfall deposited on each of the plates. <u>Discuss:</u> .Which has more dustfall, the air in the classroom or the air outside? .Can this difference be explained?

UNDERSTANDINGS AND AL CONCEPTS

Measurement
of the amount of
dust, and other
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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Perform the following experiment to find out which has more dustfall - the air in the classroom or the air outside of the school:

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- Compare the amount of dustfall deposited on each of the plates.

Discuss:

- .Which has more dustfall, the air in the classroom or the air outside?
- .Can this difference be explained?

SUPPLEMENTARY INFORMATION FOR TEACHERS

To determine the amounts and kinds of particles that settle out of the air, dustfall collection jars are placed on low, flat roofs at several locations. The jars contain distilled water, and in the winter, distilled water and antifreeze. They are exposed for a period of 1 month after which the dustfall is collected and analyzed. The amount of dustfall is usually expressed in tons per square mile per month. Some cities have experienced dustfall deposits of over 300 tons per square mile per month. Recently the dustfall in these cities has decreased to about 50 to 75 tons per square mile per month. The dustfall deposit in rural areas is much less. It amounts to only about five tons per month over each square mile.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
4. Laws and regulations for air pollution control	Numerous laws and regulations regarding air pollution control have been enacted by cities, counties, states, and the Federal Government.	
a. Federal	Efforts by the Federal Government to control air pollution have been chiefly in the provision of funds to assist state and local governments.	Discuss with class the following statement and its implications for air pollution control: -A recent Federal law requires that all new motor vehicles sold in the United States must be equipped with devices which limit the escape of exhaust pollutants such as carbon monoxide and unburned fuel.
b. State	The laws and regulations adapted by states have, in general, attempted to define standards of air quality.	Collect and display current articles from newspapers and magazines, concerning air pollution in New York State. Discuss the reasons why the metropolitan area of New York City and the Niagara-Frontier area of western New York are the worst areas of air pollution.
c. Local	Many of the laws and regulations of cities and counties relate to	Discuss with the class: -Are there regulations regarding the burning of

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Discuss with class the following statement and its implications for air pollution control:
-A recent Federal law requires that all new motor vehicles sold in the United States must be equipped with devices which limit the escape of exhaust pollutants such as carbon monoxide and unburned fuel.

Collect and display current articles from newspapers and magazines, concerning air pollution in New York State.

Discuss the reasons why the metropolitan area of New York City and the Niagara-Frontier area of western New York are the worst areas of air pollution.

Discuss with the class:
-Are there regulations regarding the burning of

SUPPLEMENTARY INFORMATION FOR TEACHERS

The following are key acts passed by Congress:

- Research and Technical Assistance Act - 1955
- Clean Air Act - 1963
- Solid Waste Disposal Act - 1965
- Air Quality Act - 1967

To a considerable extent, New York State's problems are interstate. In New York City and its environs, the prevailing winds bring smoke and pollutants from New Jersey and deposit them in New York. Because of the heavy concentration of industry and the large population, the metropolitan area of New York City and the Niagara-Frontier area of western New York are the worst areas of air pollution.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
	the burning of fuels, the use of incinerators, and other operations that create air pollution prob- lems.	soft coal as a fuel in the community? -What specific action is being taken in the com- munity regarding air pol- lution control? -Is this action adequate or inadequate? Why? -What action can students take regarding air pollution?
V. Food Protection		
A. Importance for health	Safe, adequate, nutri- tious food is necessary for good health.	Discuss with pupils the four basic food groups. Have pupils make a picture collection for a bulletin board display of examples of food from the four groups. Label as to group designation. See Strand I, Nutrition Grades 4, 5, 6.
B. Food handling	Proper food handling pro- duces safe, attractive, and nutritious food.	
1. Definition of food handling	Food handling means all the things that hap- pen to food from the time it is grown until the time it is eaten.	Have class committee re- search a specific food from its source to the table. Draw a mural il- lustrating this process.

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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See Strand I, Nutrition
Grades 4, 5, 6.

Have class committee re-
search a specific food
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SUPPLEMENTARY INFORMATION FOR TEACHERS

As more and more citizens
become aware of the dan-
gers and the increasing
seriousness of air pol-
lution, there will be an
increased demand for more
adequate laws controlling
the release of pollutants.

The four basic food groups
include:

- milk
- vegetable-fruit
- meat
- bread-cereal.

Man depends on food:

- to sustain life
- to provide energy
- to prevent deficiency
diseases e.g., rickets,
scurvy, and pellagra.

Handling includes the fol-
lowing processes:

- farming (planting - har-
vesting)
- processing
- .freezing

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

2. Contamination problems

Food becomes contaminated
through improper handling.

Discuss the potential
sources of food contamination in one or more
areas of food handling
(farming--use of insecticides; canning--improper
cooking temperature)

Rapidly perishable foods
are more difficult to
keep free from contamination.

Ask children to describe
and draw conclusions on
the following experiment:
Keep some milk unrefrigerated in the room and an
equal amount under refrigeration. After a few
days compare the differences between the milk
samples.

-What happened?

-Why?

-What is the cause?

A chart can be kept on
the length of time that
passes before the refrigerated sample of milk
sours.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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SUPPLEMENTARY INFORMATION FOR TEACHERS

.drying
.canning
.freeze-drying
.smoking
.pickling
-packaging
-storage
-distribution
-preparation for eating.

Microorganisms need warmth,
food, water to live. They
are injured or destroyed
by sunlight, drying, ex-
tremes of temperature,
and a variety of chemicals.

Examples of rapidly per-
ishable foods are:

-milk and milk products
-salads and food combina-
tions
-food from the meat group
(meat, fish, poultry, eggs)
-pastries, custards, pies.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Milk is pasteurized to
destroy the microorgan-
isms that cause disease.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Have a committee of chil-
dren research the life of
Louis Pasteur or teacher
may read story to the class.
A skit can be written and
acted out of the discovery
of pasteurization.

- Was this an example of
a carefully planned sci-
entific experiment?
- What was the motivation?
Was it critical? Explain.
- Does it still apply
today?
- Was it a group effort
or primarily the work
of an individual?

3. Additive problems

Additives which are
sometimes used during
handling may be a source
of potential contamina-
tion.

Have children bring food
wrappers/labels to find
out what ingredients have
been added for color,
flavor, or preservation.

UNDERSTANDINGS AND AL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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SUPPLEMENTARY INFORMATION FOR TEACHERS

Two major methods of pas-
teurization are:

- .holding method
 - .milk is heated and
held at 145°F. for
30 minutes and rapidly
cooled at 45°F.
- flash method
 - .milk is heated to 161°F.
for 15 seconds and then
rapidly cooled.

Examples of diseases that
may be incurred from food
sources include:

- milk borne
 - .tuberculosis
 - .typhoid
 - .brucellosis
 - .septic sore throat
 - .scarlet fever
- meat borne
 - .parasitic (trichinosis,
tapeworm)
 - .septicemia
 - .pyemia
- other food borne
 - .salmonellosis
 - .botulism food poisoning
 - .staphylococcus
poisoning
 - .clostridium perfringens

Additives are used in food
for the purpose of preserv-
ing coloring, thickening
and flavoring. These ad-
ditives may or may not be
harmful.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

C. Supervision of food

1. Agencies-laws

Laws, regulated by various governmental agencies, require that food stores and food handlers maintain high sanitary standards to avoid transmission of disease.

Have class committee invite local food business operator to talk to the class about sanitation regulations in the operation of his business.

Visit the school cafeteria or invite the dietitian to speak to the class concerning the procedure required to safeguard food production and service, as well as nutritional value.

UNDERSTANDINGS AND MENTAL CONCEPTS

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SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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tional value.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Some additives are:

- iodine in salt
- coloring
- non-nutritive sweeteners
- preservatives (sodium benzoate)

Sanitary codes require
routine inspection of
establishments where food
is:

- sold
- manufactured
- prepared
- processed
- stored
- served.

Examples of governmental
agencies:

- Food and Drug Administra-
tion
 - .enforces pure food and
drug law
 - .implements the law for
products other than
meat and poultry
 - .conducts extensive
animal tests with ad-
ditives before these
can be released for
human use
- Public Health Service
 - .investigates epidemics
 - .teaches home sanitation
technique

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

2. The consumer

Each person must accept
the responsibility of
safeguarding his food
against contamination.

Have children clip pictures and articles pertaining to food handling. Discuss these pictures and articles with the class.
Ask pupils to:
-itemize foods left over at home for 2 days
-tell how leftovers were handled.

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

Each person must accept
the responsibility of
safeguarding his food
against contamination.

Have children clip pic-
tures and articles per-
taining to food handling.
Discuss these pictures
and articles with the class
Ask pupils to:
-itemize foods leftover
at home for 2 days
-tell how leftovers were
handled.

- .supervises shellfish
growing, shopping, storing
- .prints informative publi-
cations
- U.S. Department of Agri-
culture
 - .inspects meat through the
Bureau of Animal Industry
- State Health Department
 - .investigates epidemics
 - .teaches home sanitation
technique
 - .prints information publi-
cations
 - .develops standards and
trains sanitarians
 - .makes inspections and
evaluates local programs
- state departments of agri-
culture
- county health departments
 - .cooperate with state
agencies
 - .speak to groups
 - .inspect
 - .train operators and food
handlers

When handling food at home:
-keep hands clean
-minimize hand-food contact
-use clean utensils and
dishes
-refrigerate cold foods
after purchasing
-remove leftovers (food
cooked and uneaten) from
table promptly,

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

- How can this be
improved?

VI. Water Treatment

A. Improvement to
health

Effective treatment of
human wastes is impor-
tant to the maintenance
of health.

Have class committee find
out what the local facili-
ties and methods are for
the collection and dis-
posal of sewage and ref-
use.

Discuss with children
what makes up sewages.
(toilet wastes, bath
wastes, sink wastes,
excretion)

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

- How can this be improved?

cover to exclude insects and rodents, refrigerate without cooling.

Guidelines for eating away from home:

- choose restaurants carefully
- report to health department restaurants which are not clean
- report to health department any illness suspected to have come from contaminated food.

Effective treatment of human wastes is important to the maintenance of health.

Have class committee find out what the local facilities and methods are for the collection and disposal of sewage and refuse.

Discuss with children what makes up sewage. (toilet wastes, bath wastes, sink wastes, excretion)

Wastes are classified as:

- sewage (liquified wastes discharged into community sewers, septic systems or cess pools)
- refuse(solid wastes not carried by sewers).

Treatment of wastes involves process of:

- collection
- transportation
- storage
- discharge
- decomposition

Accumulated wastes affect healthful living standards by:

- creating offensive odors
- destroying natural beauty of land
- attracting insects, rodents, and disease-causing organisms

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
B. Sewage (liquid waste)	The effective treatment and safe discharge of sewage is a primary health concern.	Discuss with children the following terms in connection with sewage treatment: -tertiary treatment -secondary treatment -primary treatment (See supplementary information.) Arrange a field trip to sewage treatment plant. Ask the tour guide to explain the treatment process used at the plant. Have a committee write letter to a local industry asking them to explain how they safely dispose of their sewage and industrial wastes. Have class make a diagram of a sewage treatment plant showing how sewage is treated. (This can be prepared on a transparency for class work.)

UNDERSTANDINGS AND MENTAL CONCEPTS

Effective treatment
safe discharge of
is a primary
concern.

SUGGESTED TEACHING AND LEARNING ACTIVITIES

Discuss with children the following terms in connection with sewage treatment:

- tertiary treatment
- secondary treatment
- primary treatment
- (See supplementary information.)

Arrange a field trip to a sewage treatment plant. Ask the tour guide to explain the treatment process used at the plant.

Have a committee write a letter to a local industry asking them to explain how they safely dispose of their sewage and industrial wastes.

Have class make a diagram of a sewage treatment plant showing how sewage is treated. (This can be prepared on a transparency for class work.)

SUPPLEMENTARY INFORMATION FOR TEACHERS

-contaminating water supplies and water recreation areas.

See Appendix A.

Sewage treatment involves the following processes:

-Basic treatment

Entering raw sewage passes a bar screen which removes large metal, wooden, and plastic items. The sewage then flows to a grit chamber where other solid material is scraped from the bottom and taken to a dump.

The sewage then flows to a primary sedimentation tank. Remaining suspended solids are allowed to settle in a tank or separated from the liquids by centrifugal action. Floating solids are skimmed from the top. The sludge is then pumped to a tank known as a digester. Here the temperature is raised to allow decomposition by bacterial action. After such decomposition, the material is pumped to drying beds where the remaining water is drained off or evaporated.

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Conduct the following experiment on the action of a settling tank:

Mix some soil, sawdust, and pieces of food in a gallon of water. Stir the mixture well. Pour through a screen into four quart jars. Use a screen with larger holes than a window screen. Each quart jar is a settling tank. Let the jars stand for a day or two.

Discuss:

- What comes to the top?
- What settles to the bottom?

Notice that the water is still very cloudy because of the very fine particles that are still in it.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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Discuss:

- What comes to the top?
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Notice that the water is still very cloudy because of the very fine particles that are still in it.

SUPPLEMENTARY INFORMATION FOR TEACHERS

-Primary treatment

.This involves taking the water which has been through the basic treatment, chlorinating it, and then releasing it into a suitable waterway.

-Secondary treatment

.This involves allowing the liquid portion from the settling tanks to trickle through a filter bed of crushed stone. This removes the fine, suspended solids from the liquid portion and renders a more highly purified effluent. These remaining solids are degraded by bacterial action and digested by algae growing on the stones. The water that filters through the bed is drawn from the bottom and, after chlorination, is fed to a stream.

-Tertiary treatment

.This treatment consists of holding the water in a final sedimentation tank and then aerating it before chlorination and discharge into a receiving stream. This

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING
AND LEARNING ACTIVITIES

Many problems of municipal sewage treatment remain.

Ask a local householder to speak to the class concerning the type of sewage system provided for in the development; the kind of treatment being conducted; the maintenance of the system; and the provisions for future expansion.

Invite an operator of a septic tank cleaning service to speak to the class to discuss operation and maintenance of septic tanks.

UNDERSTANDINGS AND
MENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

step renders water suitable
for recirculation and reuse.
(From: Water Pollution,
State Education Department)

Sewage can be a cause of
a dangerous form of water
contamination by micro-
organisms contained in
human wastes resulting in
serious disease such as:
-cholera
-dysentery
-hepatitis
-parasitic infections
-typhoid fever.

problems of municipi-
sewage treatment
in.

Ask a local housing devel-
oper to speak to the class
concerning the type of
sewage system provided
for in the development;
the kind of treatment
being conducted; mainten-
ance of the system; and
the provisions for ex-
pansion.

Invite an operator of a
septic tank cleaning con-
cern to speak to the class
to discuss operation and
maintenance of septic
tanks.

New York State Department
of Health took action in
1965 to encourage com-
munities to update sewage
treatment facilities. It
provided for the establish-
ment of minimum standards
for treated wastes dis-
charged into New York State
waters.

Some unsolved problems of
modern sewage treatment in-
clude:
-population growth which makes
existing systems grossly
inadequate,
-lack of available funds
 .new facilities not in-
 stalled
 .old facilities in dis-
 repair

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
C. Refuse (solid wastes)	Refuse is defined as the trash, garbage, and other materials which no longer have a use. There are many methods of treating refuse such as: -burning -burying -compaction -decomposition.	Discuss the three major classes of refuse (garbage, combustible rubbish, noncombustible rubbish). Discuss questions as: -What does combustible mean? -How can you get rid of things that won't burn? -What problems does burning cause? -What are some advantages and disadvantages of "no deposit" bottles? Invite the school maintenance man to discuss with the class how school refuse is collected and disposed and what part the students can play. Have class committees search and report to class: -how residential community refuse is collected and disposed of -how commercial community (shopping centers, office building, etc.) refuse is collected and disposed of

UNDERSTANDINGS AND MENTAL CONCEPTS

Refuse is defined as the
trash, garbage, and other
materials which no longer
have a use.

There are many methods
of treating refuse such
as burning,
landfilling,
incineration,
recycling,
and composting.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Discuss the three major
classes of refuse (gar-
bage, combustible rubbish,
noncombustible rubbish)
Discuss questions as:
-What does combustible
mean?
-How can you get rid of
things that won't burn?
-What problems does burn-
ing cause?
-What are some advantages
and disadvantages of
"no deposit" bottles?

Invite the school main-
tenance man to discuss
with the class how school
refuse is collected and
disposed and what part
the students can play.

Have class committees re-
search and report to class:
-how residential community
refuse is collected and
disposed of
-how commercial community
(shopping centers, office
building, etc.) refuse is
collected and disposed
of

SUPPLEMENTARY INFORMATION FOR TEACHERS

- lack of large enough land
areas
- combined sewers (sanitary
sewers and storm sewers).

Refuse amounts to 18 million
tons of trash and garbage
a year in the State of
New York - one ton per per-
son per year.

- Refuse treatment procedures:
- storage in receptacles
 - collection
 - .public works department
 - .private company li-
censed by state to col-
lect refuse
 - disposal methods
 - .sanitary landfill
 - (a) refuse compacted
 - (b) covered with earth
daily
 - (c) efficient, inex-
pensive when land
is available
 - .incineration
 - .open dumping

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

-types of receptacles available for refuse storage and the advantages and disadvantages of the various types.

Discuss with children the advantages and disadvantages of the methods of disposal presently used in the community.

Ask such questions as:

-Is it adequate?

-Will it need to be changed to take care of community changes within the next 10 years?

Have pupils determine the amount of trash disposed of by their family for a day (number of sacks, etc.). How much does the entire class represent?

Inadequate disposal of refuse produces unhealthy, unsanitary, and unsightly environmental conditions.

Have children make a collage of pictures of areas blighted by dumps, uncollected refuse, etc.

Form a class cleanup campaign to clean up the school. This committee could work in conjunction with committees from other classes.

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION FOR TEACHERS

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Form a class cleanup campaign to clean up the school. This committee could work in conjunction with committees from other classes.

- (a) unsanitary
- (b) source of pollution, odor, disease
- .compaction
 - (a) for reusable material
 - (b) in experimental stage
- .compositing
 - organic refuse converted to humus-like material
- .recycling
 - cans, glass bottles, etc.

Laws concerning sanitary refuse treatment:

- New York State Sanitary Code (1963) (part 19) - sets standards for operation and maintenance of refuse disposal facilities.
- Federal Solid Wastes Act (1965) provides funds for research and demonstration projects.

Problems of inadequate refuse disposal arise because:

- increases in population result in increased amounts of waste
- industry has created almost indestructible packaging materials
- historic methods are ineffective
 - .space for dumping is becoming unavailable

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

VII. Insects and Rodents

Many insects and rodents cause or contribute to unhealthful conditions. By changing these conditions that encourage the breeding, feeding, and watering of rodents and insects, man can inhibit their number.

Discuss with children the conditions which contribute to increases in the numbers and kinds of pests. Have committee list areas in the school, home, and community which are potential breeding places for pests.

A. Rodents

Rodents contribute to unhealthy conditions.

Have individual children or committees research and report on such items as:
-habits and behavior of rats: eating, nesting, travel routes
-abilities of rats: hearing, sight, agility

STANDINGS AND CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION FOR TEACHERS

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Discuss with children the conditions which contribute to increases in the numbers and kinds of pests. Have committee list areas in the school, home, and community which are potential breeding places for pests.

Have individual children or committees research and report on such items as:

- habits and behavior of rats: eating, nesting, travel routes
- abilities of rats: hearing, sight, agility

.incineration methods pollute the air
 Hope for the future rests with:

- materials being recycled (aluminum cans)
- materials being recovered (sewage sludge for fertilizer)
- materials being reused (glass bottles)
- discovery of new disposal systems
- consumer demand for refuse-free packaging from industry.

Conditions which favor the survival and multiplication of pests are:

- improper individual and community disposal of sewage, animal droppings;
- throwing trash in empty lots, along streets, etc.;
- unprotected food supplies;
- stagnant water.

Recognizing common rodents:

1. Rats
 - Norway rats
 - .most common infesting homes and businesses
 - .largest
 - (a) length - 7 to 10 in.
 - (b) weight - 3/4 lb.
 - .usually gray, also reddish brown and black

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
B. Insects	Insects contribute to unhealthy environmental conditions.	Discuss with class various common insects the conditions under which they are prevalent. Take a field trip to a stagnant pond or insect breeding area to discover the conditions conducive to the life of insects.
C. Need for control	It is necessary to con- trol insects and rodents as they are an annoyance to comfortable living and may transmit diseases.	Discuss with pupils the potential consequences of uncontrolled insect and rodent populations.

UNDERSTANDINGS AND
MENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

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lthy environmental
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Discuss with class var-
ious common insects and
the conditions under which
they are prevalent.

Take a field trip to see
a stagnant pond or other
insect breeding area to
discover the conditions
conducive to the breeding
of insects.

Discuss with pupils the
potential consequence of
uncontrolled insect and
rodent population.

Roof rats
.smaller than Norway
rats
(a) length - 6 to 8 in.
(b) weight - 1/2 lb.
.gray or black

2. House mouse
.half length of rat
.large ears

Common signs of rodent in-
festation:
-gnawing
-burrows
-droppings
-runways
-footprints or tail marks
-rat odor from urine
-old nests
-live or dead rodents.

Common household insects
include:
-household fly
-mosquito
-bedbug
-ant
-cockroach
-flea
-moth.

Potential consequences of
uncontrolled fly population:
-diseases

REFERENCE

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AND LEARNING ACTIVITIES

Have class committee search and report on pests have affected history by infecting man with yellow fever, malaria, plague, and other diseases. These reports may be skits as well as oral reports.

D. Methods of control

Man uses various methods to control or destroy rodents and insects. This battle must be a persistent one for all people.

Discuss with class the various methods of rodent and insect control.

Discuss with children the statement: "Sanitation is the safest and most effective means of controlling insects."

Have class make a chart for the bulletin board

OR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

Have class committee re-
search and report on how
pests have affected his-
tory by infecting man
with yellow fever,
malaria, plague, and other
diseases. These reports
may be skits as well as
oral reports.

- .worm infection
- .infection on skin
- .dysentery
- .other communicable
diseases carried from
contaminated sources
- annoyance:
 - .biting
 - .buzzing
 - .destruction of food
supplies.

Potential consequences of
uncontrolled rat population:

- diseases, such as,
 - .murine typhus fever
 - .rat bite fever
 - .salmonellosis
 - .hemorrhagic jaundice
 - .plague - pneumonic,
bubonic leptospirosis
- annoyance
 - .damaging food
 - .frightening people
- damage to buildings -
wiring.

uses various methods
control or destroy
ants and insects.
s battle must be a
sistent one for all
ple.

Discuss with class the
various methods of rodent
and insect control.

Discuss with children the
statement: "Sanitation
is the safest and most
effective means of con-
trolling insects."

Have class make a chart
for the bulletin board

Methods of rat control:

- proper sanitation
 - .adequate refuse and
sewage treatment (most
effective because result
is to starve the rats and
deprive them of breeding
places)
- use of
 - .poisons/pesticides
 - .traps
 - .fumigation

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING
AND LEARNING ACTIVITIES

listing various pesticides
their proper use
potential harm.

Have class commit to
sign leaflet and
letters for homeowners
encourage and explain
pest control and
prevention.

OR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

listing various pesticides,
their proper use and po-
tential harm.

.rat proofing
.report regulations by
Public Health Services.

Have class committee de-
sign leaflet and/or pos-
ters for homeowners to
encourage and explain
pest control and preven-
tion.

Methods used for fly con-
trol:

- prevent breeding by:
 - .protecting food
 - .adequate refuse and
sewage treatment
- insecticides
- fly traps - swatters
- screening.

Methods used for mosquito
control

-during larval (aquatic)
stage:

- .remove stagnant water
(drainage, filling with
dirt, oil application
to standing water)
- .stock lakes with larvae-
eating fish;

-during adult stage:

- .screening
- .aerosol sprays
- .DDT residual sprays
(outlawed in some areas)
- mosquito bars.

Pesticides have played an
important role in controlling
insects in:

- improved agricultural yields
- improved national nutri-
tional status.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
E. Responsibility for control	Individual citizens, private agencies and government share a re- sponsibility for the control of insects and rodents.	Discuss with class such questions as: -What can you do at home to help in controlling insects? -Why are flies and mos- quitos a summertime pro- blem? -Why do cities have greater rodent problems than suburbs? Invite an operator of an exterminating company to speak to the class con- cerning insect and rodent control. -How does he guard against polluting the environment? -What kinds of techniques does he use?

UNDERSTANDINGS AND MENTAL CONCEPTS

Individual citizens,
agencies and
government share a re-
sponsibility for the
control of insects and
rodents.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

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questions as:
-What can you do at home
to help in controlling
insects?
-Why are flies and mos-
quitos a summertime prob-
lem?
-Why do cities have
greater rodent problems
than suburbs?

Invite an operator of an
exterminating company to
speak to the class con-
cerning insect and rodent
control.

- How does he guard
against polluting the
environment?
- What kinds of technique
does he use?

SUPPLEMENTARY INFORMATION FOR TEACHERS

Recently alternative ap-
proaches have been sought
because:

- contamination is accumulating
and the ecological balance
is upset.

Individuals can control in-
sects and rodents by:

- keeping garbage cans clean
and closed
- keeping food protected
- not allowing water to
collect in drains, ditches,
containers
- rat proofing food storage
areas
- keeping screens in good
repair
- filling all crevices in
and around buildings
- using insecticides and
pesticides carefully

Agencies can control in-
sects and rodents by:

- enforcing laws
 - .against open dumping
 - .regulating hog feeding
 - .pertaining to health and
building codes
- furnishing services, such
as
 - .garbage disposal
 - .pest control
 - .information distribution.

REFERENCE	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AND LEARNING ACTIVITIES
VIII. Maintaining a Healthful Environ- ment		
A. In the home	A healthful home environ- ment provides family members with a safe, disease-free place to live.	Research and report on the three components of a home environment: safety, clothing, shelter, and culture differences. Illustrate report with drawings and pictures from magazines.
1. Purpose		
2. Responsibility	Each family member shares the responsibility of maintaining a safe and healthy home environment.	Have class act out a play showing: -the role of a father, mother, and a child -how each role contributes to a healthy home environ- ment.
B. In the community	A healthful community is one that is a safe, desir- able place in which to live and work.	Have pupils create a comic story or skit about a day/week a service is done (garbage disposal, electricity, public trans- portation). Identify and discuss these problems at the individual and community level.
1. Purpose		
2. Service- responsibility	Communities need many health services to meet the needs of their mem- bers. These services are the responsibility of individuals, volun- tary service groups, and governmental agencies at all levels.	Have children draw a mural or collect pictures for a collage depicting services that are provided for through taxes (garbage, water, maintenance, etc.).

OR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION FOR TEACHERS

Healthful home environ-
ment provides family
members with a safe,
peace-free place to
live.

Research and report on
the three components of
home environment (food,
clothing, shelter) in a
culture different from
yours. **Illustrate the**
report with drawings or
pictures from magazines.

Components of home environ-
ment pertain to food,
clothing, and shelter.
These components are dif-
ferent in different cul-
tures.

See Strand III, Mental
Health, 4, 5, 6.

Each family member
shares the responsibility
of maintaining a safe and
healthy home environment.

Have class act out a skit
showing:
-the role of a father, a
mother, and a child
-how each role contributes
to a healthy home en-
vironment.

Healthful community is
one that is a safe, desir-
able place in which to
live and work.

Have pupils create a
story or skit about the
day/week a service broke
down (garbage disposal,
electricity, public trans-
portation). Indicate how
these problems affected
the individual and the
community.

Communities need many
health services to meet
the needs of their mem-
bers. These services
include the responsibility
of individuals, volun-
teer service groups, and
governmental agencies at

Have children draw a
mural or collect pictures
for a collage depicting
services that are paid
for through taxes or fees
(garbage, water, road
maintenance, etc.).

Community health services
include:
-garbage removal
-protection of food, water,
air
-utilities
-gas and oil

REFERENCE

MAJOR UNDERSTANDINGS AND
FUNDAMENTAL CONCEPTS

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

the Federal, State, and
local levels.

UNDERSTANDINGS AND
MENTAL CONCEPTS

Federal, State, and
local levels.

SUGGESTED TEACHING AIDS
AND LEARNING ACTIVITIES

SUPPLEMENTARY INFORMATION
FOR TEACHERS

- .water
- .electricity
- .telephone
- medical
 - .hospital and clinics
- transportation
 - .mass transportation
 - .road maintenance
- social services
 - .welfare
 - .rehabilitation
- recreation.

Individuals assume responsibility by:

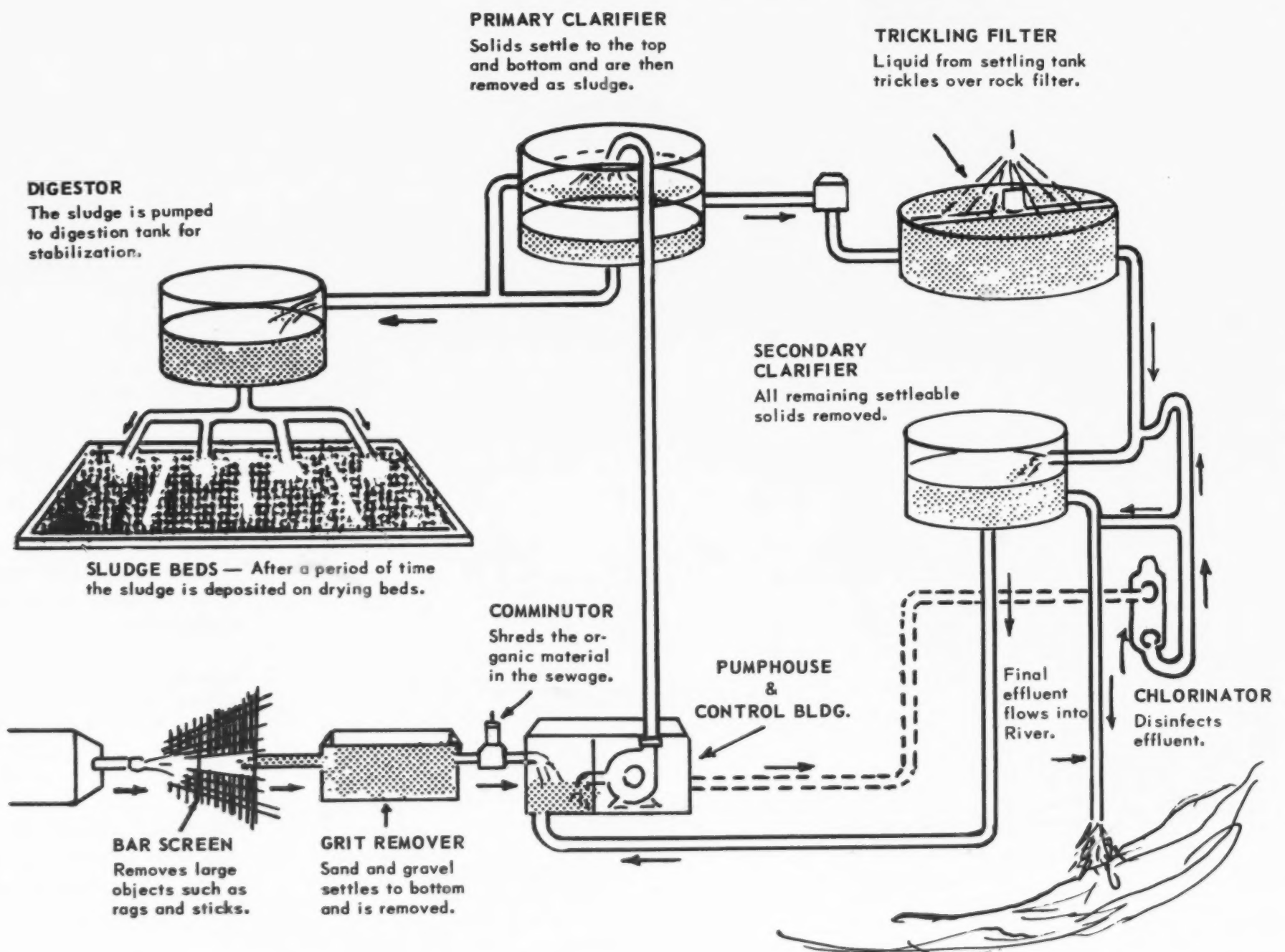
- paying taxes and giving donations
- caring for private and public property
- joining community groups.

Voluntary service groups donate time and money for the betterment of the community.

Agencies at the Federal, State and local levels share responsibility for maintaining community health.

Teacher reference:
See the telephone directory for listing of various agencies.

HOW A SEWAGE TREATMENT PLANT WORKS



SCHEMATIC DIAGRAM WATER TREATMENT PLAN

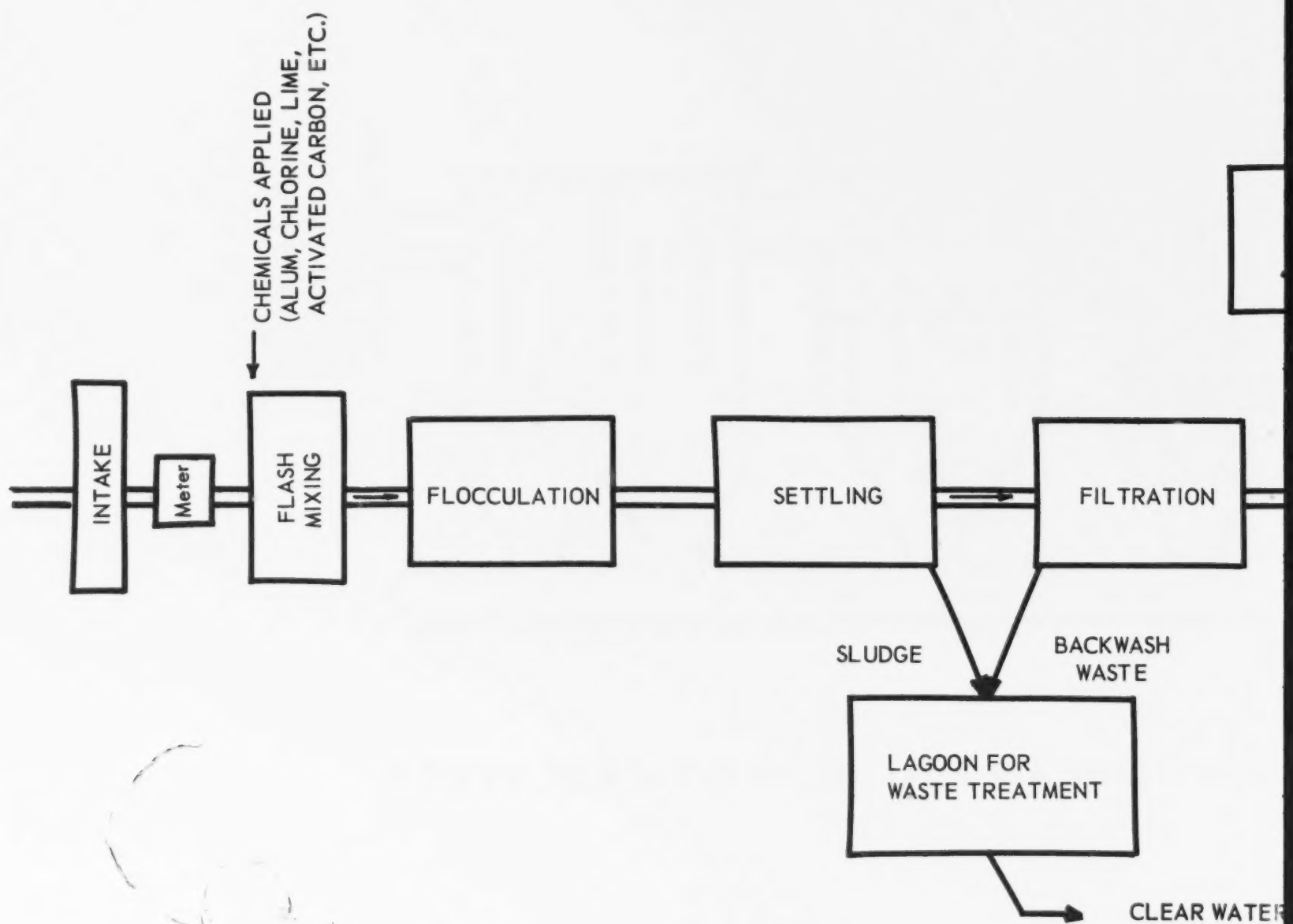
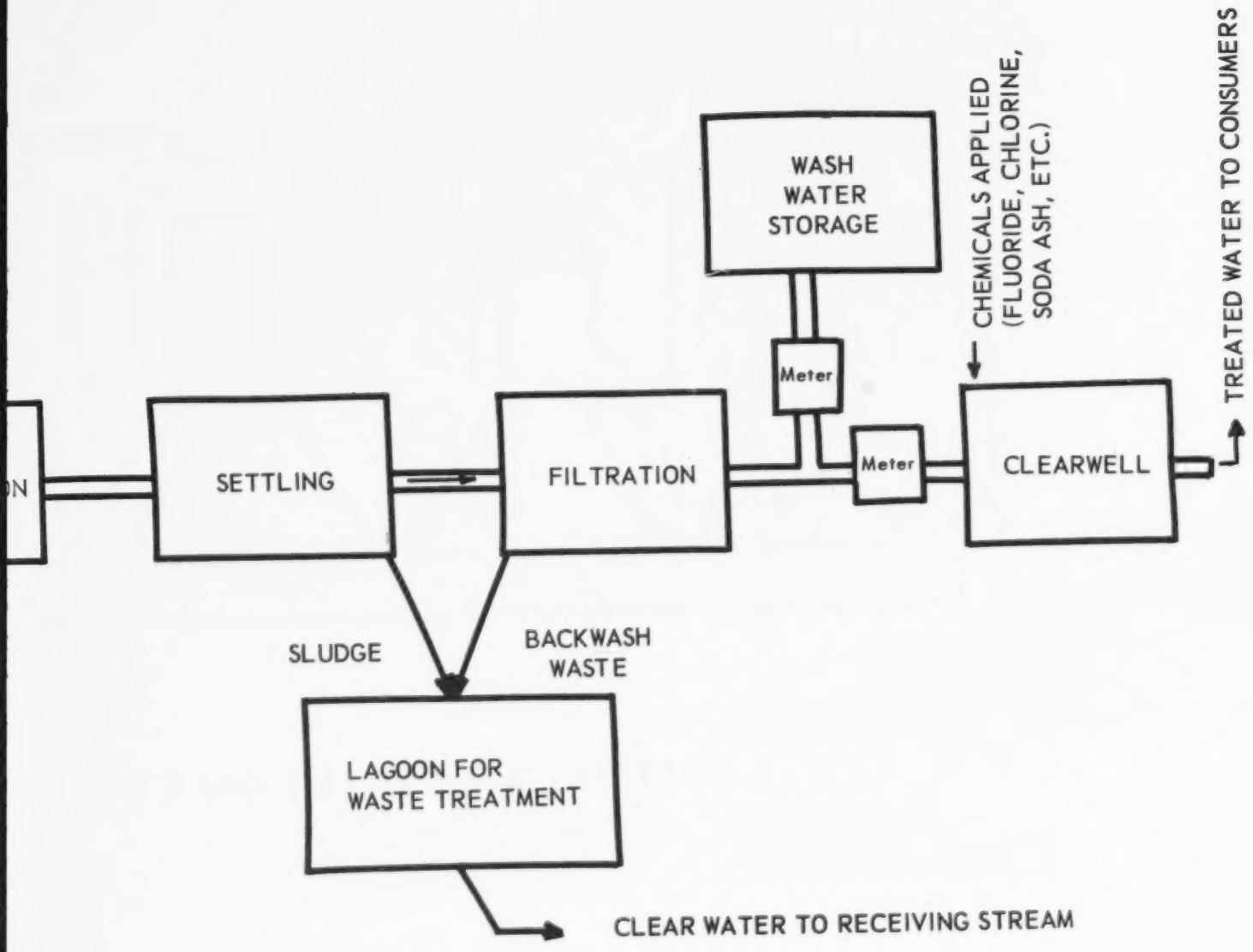
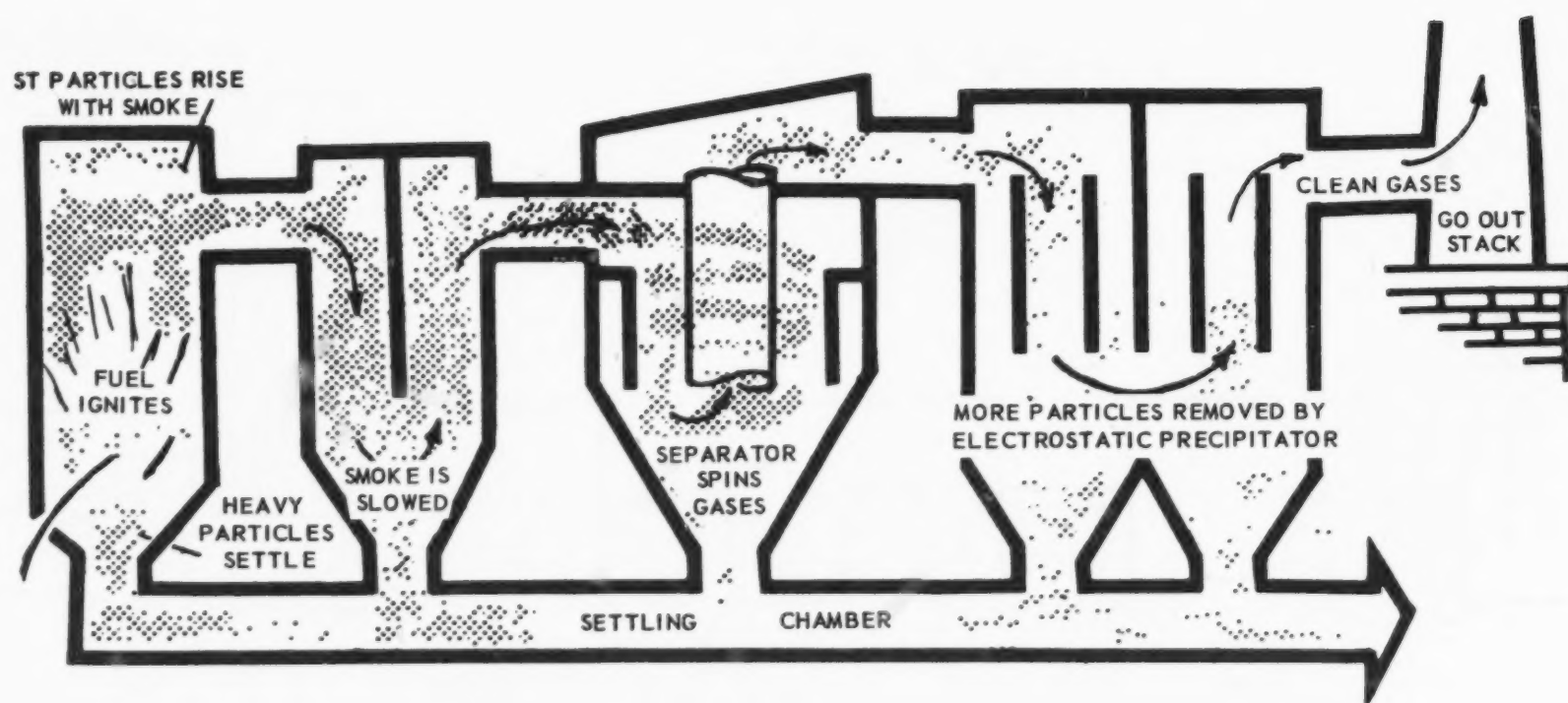


DIAGRAM WATER TREATMENT PLANT





AN INDUSTRIAL AIR POLLUTION CONTROL SYSTEM

APPENDIX D - SCIENTISTS AND THEIR CONTRIBUTIONS

Curie, Marie	A scientist who, with her husband Pierre, won the Nobel discovery of radium.
Fleming, Alexander	A British scientist who discovered that penicillin can
Hippocrates of Cos	A Greek physician whose beliefs constituted the beginning
Jenner, Edward	An English physician who learned how to vaccinate people immune to smallpox.
Leeuwenhock, Anton van	The Dutch scientist who made one of the first microscopes and discovered microorganisms.
Lister, Joseph	An English surgeon who found that carbolic acid sprayed the air. Lister's discovery has helped reduce the risk of infection.
Pasteur, Louis	A French chemist who discovered that heat can kill bacteria from the air.
Salk, Jonas E.	An American physician who helped to find a vaccine that protected against polio.

APPENDIX D - SCIENTISTS AND THEIR CONTRIBUTIONS

Scientist who, with her husband Pierre, won the Nobel Prize in 1903 for the discovery of radium.

British scientist who discovered that penicillin can kill certain germs.

Greek physician whose beliefs constituted the beginning of medical science.

English physician who learned how to vaccinate people so they would be immune to smallpox.

Dutch scientist who made one of the first microscopes and used it to study microorganisms.

English surgeon who found that carbolic acid sprayed in the air will sterilize the air. Lister's discovery has helped reduce the risk of infection in surgery.

French chemist who discovered that heat can kill bacteria which enters food from the air.

American physician who helped to find a vaccine that makes most people immune to polio.

APPENDIX C

Full Names, Addresses, and Telephone Numbers of the Regional Offices of

NEW YORK CITY OFFICE

270 Madison Avenue, New York, New York 10016
Area Code 212 689-9070

ALBANY REGIONAL OFFICE

Room 412, Taxation and Finance Building No. 9
The State Campus, Albany, New York 12226
Area Code 518 457-5150

BUFFALO REGIONAL OFFICE

584 Delaware Avenue, Buffalo, New York 14202
Area Code 716 842-4336

ROCHESTER

1122 Comm
Rochester,
Area Code

SYRACUSE R

Room 245,
333 East W
Area Code

WHITE PLAI

901 North
Area Code

APPENDIX C

Telephone Numbers of the Regional Offices of New York State Health Department

ROCHESTER REGIONAL OFFICE

k, New York 10016

1122 Commerce Building, 119 East Main Street
Rochester, New York 14604
Area Code 715 546-6556

SYRACUSE REGIONAL OFFICE

ance Building No. 9
New York 12226

Room 245, State Office Building
333 East Washington Street, Syracuse, New York 13202
Area Code 315 474-5951

WHITE PLAINS REGIONAL OFFICE

o, New York 14202

901 North Broadway, White Plains, New York 10603
Area Code 914 949-6314

ENVIRONMENTAL AND PUBLIC HEALTH

Multimedia Resources (K-6)

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ENVIRONMENTAL AND PUBLIC HEALTH

Multimedia Resources (K-6)

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AUDIOVISUAL AIDS

FILMS

All requests for the following films should be addressed to:

Film Library Supervisor
Office of Public Health Education
New York State Department of Health
84 Holland Avenue
Albany
New York 12208

"Air pollution, everyone's problem." 20 min. Color.
The story of air pollution, its causes and effects.

"Crisis on our rivers." 13 1/2 min. Color.
This up-to-the-minute film deals with a problem common to every state in the
It emphasizes that water pollution is the responsibility of every citizen. Narr.
personality, John Daly.

"A decent burial." 12 1/2 min. Color.
This is an entertaining sound-color film explaining the simplicity, effective
sanitary-landfill method of refuse disposal.

"Every drop a safe one." 10 min.
Illustrates the danger of drinking water from streams exposed to pollution.

"The first mile up." 28 min.
This film is a study of the current air pollution problem. Factors involved
discussed.

d. McGraw-Hill Book Co. 1969.

Rand McNally. 1968. (Somewhat advanced but very readable.)

AUDIOVISUAL AIDS

should be addressed to:

Library Supervisor
Office of Public Health Education
New York State Department of Health
101 Holland Avenue
Albany
New York 12208

10 min. Color.
Causes and effects.

Color.
With a problem common to every state in the Union - stream pollution.
The responsibility of every citizen. Narration done by TV

or film explaining the simplicity, effectiveness, and economy of the
disposal.

g water from streams exposed to pollution.

nt air pollution problem. Factors involved in air pollution are

"Health and the cycle of water." 20 min.

Dramatic interest is supplied in this film by the trials and tribulations of a hypothetical small town in the 1890's when stream pollution was more the rule than the exception.

"A healthier place to live." 12 min.

Stresses the basic principles of environmental sanitation and was filmed at a farm labor camp. A story of actual camp life demonstrating practices familiar to the general public.

"Keep 'em out." 10 min.

Shows how rats spoil food, destroy buildings, spread disease. Demonstrates methods of rat trapping, and ratproof construction of buildings.

"Key to progress." 20 min. color.

This film is an excellent presentation of community efforts to obtain a better environment.

"Municipal sewage treatment processes." 13 min.

An excellent informative film depicting the basic methods of sewage treatment and the dangers of discharging sewage into streams or becoming a health menace.

"Safe drinking water from small water supplies." 11 min.

The unsafe features of bored, driven, and drilled wells illustrated diagrammatically together with the correct and safe methods of installation and design. Includes a section on the importance of proper well design.

"The third pollution." 23 min. color.

This film demonstrates and explains how burning refuse contributes to air pollution and how refuse contaminates water.

"Water." 14 1/2 min. color.

The general problems related to worldwide water needs and availability are discussed. A Nations-sponsored film. It shows the need for cooperation among countries.

"The waters around us." 25 min.

A documentary film dealing with the problem of water pollution as it affects the world.

"Wise use of water resources." 13 1/2 min. color.

Live science photography diagrams and animation explain and illustrate the water cycle, the abundance of water, its value as a natural resource, and its use for various purposes. Methods are emphasized throughout the presentation.

"With each breath." 28 1/2 min. color.

This film narrated by Hume Cronyn, deals with issues involved in the fight against air pollution.

ter." 20 min.
applied in this film by the trials and tribulations of the citizens of a hypo-
e 1890's when stream pollution was more the rule than the exception.

" 12 min.
nciples of environmental sanitation and was filmed in a typical domestic seasonal
of actual camp life demonstrating practices families can use to stay healthier.

ood, destroy buildings, spread disease. Demonstrates control measures by poison,
nstruction of buildings.

color.
ent presentation of community efforts to obtain a sewage treatment facility.

processes." 13 min.
ve film depicting the basic methods of sewage treatment used to prevent sewage
becoming a health menace.

small water supplies." 11 min.
bored, driven, and drilled wells illustrated diagrammatically and in pictures to-
and safe methods of installation and design. Intended primarily for rural areas.

min. color.
and explains how burning refuse contributes to air pollution, and how dumping
f.

or.
related to worldwide water needs and availability are presented in this United
It shows the need for cooperation among countries for a common goal.

6 min.
aling with the problem of water pollution as it affects the city of New York.

es." 13 1/2 min. color.
phy diagrams and animation explain and illustrate concepts relating to properties
its value as a natural resource, and its use for consumer supply. Conservation
throughout the presentation.

2 min. color.
Hume Cronyn, deals with issues involved in the fight for clean air. While it

dramatizes and documents the story of New York State Air Pollution Control Program problem of air pollution in a national context.

OTHER FILMS

"Air pollution - take a deep breath." 54 min. color. ABC. McGraw-Hill.

"Auto, U. S. A." 25 min. Dynamic Films, Inc., 405 Park Ave., New York, New York.
Shows how the record breaking increases in motor vehicle use and the resultant threatening the economic and social health of our communities.

"Breathe at your own risk." 58 min. Communicable Disease Center (Audiovisual), Atlanta.
Shows scenes of air pollution at its worst from Los Angeles to New York.

"Clean waters." 24 min. color. General Electric, 113 South Salina St., Syracuse, N.Y.
A forceful story of the \$100 million annual loss due to pollution of our water.

"Good riddance." 29 min. color. Ohio River Valley Water Sanitation Commission, Cincinnati, Ohio 45202.
The dangers of pollution to city water supply systems, recreational areas, fishing, and boating dramatically illustrated.

"New air for New York." 13 1/2 min. color. Association Films, Inc., 374 Madison Ave., New York 10017.

"Our poisoned air." 58 min. Communicable Disease Center (Audiovisual), Atlanta, Georgia.
Answers: What is air pollution? What does it do to us and our environment? How can we control air pollution? What further action is required?

"The poisoned air." 50 min. color. CBS. Carousel Films, Inc., 1501 Broadway, New York, N.Y.

"Radiation in perspective." 43 min. color. U.S. Department of Agriculture, Office of Public Affairs, Washington, D.C.
Beneficial uses of radioactive materials in medicine, research, industry, and agriculture, and in this film, and the health hazards of radiation exposure are explained.

"Regulation of atomic radiation." 28 min. U. S. Atomic Energy Commission, 376 Hudson St., New York 10014

the story of New York State Air Pollution Control Program, it also views the
in a national context.

ep breath." 54 min. color. ABC. McGraw-Hill.

Dynamic Films, Inc., 405 Park Ave., New York, New York.
breaking increases in motor vehicle use and the resultant traffic congestion are
and social health of our communities.

58 min. Communicable Disease Center (Audiovisual), Atlanta, Georgia 30322.
ollution at its worst from Los Angeles to New York.

color. General Electric, 113 South Salina St., Syracuse, New York
he \$100 million annual loss due to pollution of our water supply.

color. Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati,
ion to city water supply systems, recreational areas, fish and wildlife are

5 1/2 min. color. Association Films, Inc., 374 Madison Ave., New York, New York

n. Communicable Disease Center (Audiovisual), Atlanta, Georgia 30322.
pollution? What does it do to us and our environment? What is being done to
What further action is required?

n. color. CBS. Carousel Films, Inc., 1501 Broadway, New York, New York 10036.

" 43 min. color. U.S. Department of Agriculture, Office of Motion Pictures,
radioactive materials in medicine, research, industry, and other fields are explored
health hazards of radiation exposureable explained.

ation." 28 min. U. S. Atomic Energy Commission, 376 Hudson St., New York, New

The film shows the ways in which radiation sources are regulated related to design, construction, and wage. The safe handling and d

"River watchers." 18 min. color. Ohio River Valley Water Sanitation Ohio 45202.

The role of those who inspect the Ohio River Basin to prevent an eight neighboring states is shown in this film.

"Sources of air pollution," "Effects of air pollution," "Control of a Center, Atlanta, Georgia 30322. Three 5-minute, 16 mm. motion pi Pollution. color. sound. TV cleared 1962.

As a concise introduction to the air pollution problem, each of viewer with the relationship between our modern, technological way

"The water famine." 54 min. b&w. CBS. Carousel Films, Inc., 1501

"Water: friend or enemy." 9 min. color. Walt Disney Productions, Indicates that water can be a friend to man if proper precaution

FILMSTRIPS

"Making water safe to drink. McGraw-Hill Book Company.

"Natural resources and you." EBEC. 34 frames. color. Gr. 4-6.

A series of filmstrips to help the class probe further into such earth's energy, feeding an exploding population, increasing soil fe

"Our health department." EBEC. 48 frames. color. (Community servi The various activities of community workers serving the public a

"Sanitation department crew." CMGH. 40 frames. color. (Community A filmstrip visualizing the services and duties of the members o

"Street maintenance crew." CMGH. 40 frames. color. (Community help Visualizes the services and duties of community helpers who are

"The water we drink." Young America Films.

the ways in which radiation sources are regulated by standards and licensing procedures construction, and wage. The safe handling and disposal of radioactive wastes are shown.

8 min. color. Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati
se who inspect the Ohio River Basin to prevent and eliminate water pollution in Ohio and
states is shown in this film.

ution," "Effects of air pollution," "Control of air pollution." Communicable Disease
Georgia 30322. Three 5-minute, 16 mm. motion pictures produced by the Division of Air
sound. TV cleared 1962.

roduction to the air pollution problem, each of these films is designed to acquaint the
relationship between our modern, technological way of life and air pollution.

54 min. b&w. CBS. Carousel Films, Inc., 1501 Broadway, New York, New York 10036.

nemy." 9 min. color. Walt Disney Productions, Inc. 500 Buena Vista St., Burbank, Calif.
water can be a friend to man if proper precautions are taken to see that it is pure.

to drink. McGraw-Hill Book Company.

and you." EBEC. 34 frames. color. Gr. 4-6.
filmstrips to help the class probe further into such basic problems as utilizing the
feeding an exploding population, increasing soil fertility, and conserving water resources.

ent." EBEC. 48 frames. color. (Community services). Gr. K-3.
activities of community workers serving the public are dramatized.

ent crew." CMGH. 40 frames. color. (Community helpers series). Gr. 2-4.
visualizing the services and duties of the members of the sanitation department.

crew." CMGH. 40 frames. color. (Community helpers series). Gr. 2-4.
services and duties of community helpers who are of significance to the young child.

" Young America Films.

"Waste disposal for the community." EBEC. 52 frames. color. (Our public utilities). Shows how the health, safety, and welfare of towns and cities depend on public utilities and services.

"Water for the community." EBEC. 52 frames. color. (Our public utilities). A visual demonstration of how the health, safety, and welfare of towns and cities depend on public utilities and services.

ADDITIONAL CURRICULUM MATERIALS

"Air pollution experiments for junior and senior high school science classes." by E. C. Wohlers, H. C., PH.D., Chairman. Education Committee, Mid-Atlantic States Science Teachers Association. 1968.

"Land for learning." Informational material. A Supplementary Educational Center at Tivoli Lakes Nature Study Sanctuary, Philip Livingston Junior High School, Albany, N.Y.

"People and their environment." Teacher's Guide to Conservation Education. Graded 5-8. Ferguson Publishing Co., 227 Park Ave., New York 10017. Jan. 1969. (A series of four guides.)

"Well of the world." A one-act play by Joan Vail Thorne. Written and produced for the Department of Health. (Dramatizes the importance of pure water.)

SOURCES OF ADDITIONAL MATERIALS AND INFORMATION

Public Health Service Publications - the following publications may be obtained from the Public Health Service, Control Administration, Washington, D.C.:

"Clean water - a chart book of America's water needs, 1900 - 1980."

"Clean water is everyone's business." Pub. No. 11 - 1950.

"Environmental health problems." Report of a Committee to the Surgeon General.

"Focus on clean water - an action program for community organizations." Pub. No. 14

EBEC. 52 frames. color. (Our public utilities). Gr. 4-6.
and welfare of towns and cities depend on public utilities and

52 frames. color. (Our public utilities). Gr. 4-6.
the health, safety, and welfare of towns and cities depend on certain

ADDITIONAL CURRICULUM MATERIALS

or and senior high school science classes." edited by Hunter, D. C., P. E.,
Education Committee, Mid-Atlantic States Section, Air Pollution Control

material. A Supplementary Educational Center for Environmental Education.
ry, Philip Livingston Junior High School, Albany, New York.

acher's Guide to Conservation Education. Grades 1-12. The J. G.
Ave., New York 10017. Jan. 1969. (A series of guidebooks.)

y by Joan Vail Thorne. Written and produced for the New York State De-
the importance of pure water.)

OF ADDITIONAL MATERIALS AND INFORMATION

he following publications may be obtained from the Federal Water Pollution
D.C.:

rica's water needs, 1900 - 1980."

s." Pub. No. 11 - 1950.

Report of a Committee to the Surgeon General. Pub. No. 908.

program for community organizations." Pub. No. 1184 - 1964.

"The living waters." Pub. No. 265.

"The living waters." Pub. No. 382 (rev. 1961).

"Pollution-caused fish kills." in four editions (1961, 1962, 1963, 1964).

"Protecting our water resources - The Federal Water Pollution Control Program."

"Source materials on water pollution control." Bib. series No. 22. Pub. No.

"The struggle for clean water - a series for teachers." No. 1 Pub. No. 958

"Selected bibliography of publications." (Relating to Undesirable Effects of
Insecticides, Weedicides). Pub. No. 400 - 1958.

"Water pollution in the United States." Pub. No. 64 - 1951.

OTHER SOURCES

ABATES -- Ambassadors to Bring Action Through Environmental Study. Statewide
with the New York State Health Department sponsor operation ABATES. Contact
for information.

American Public Health Association: "Swimming pools and other bathing places
design, equipment, and operation." The Association. New York. 1957.

"Suggested ordinances and regulations covering public swimming pools."
1964.

"Environmental health planning guide." U. S. Public Health Service. Washington.

"Focus on clean water." U. S. Public Health Service. Washington, D. C. 1964.

League of Women Voters of the United States. "The big water fight - trials
on problems of supply, pollution, floods, and planning across the U.S.A."
Greene Press. 1966.

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382 (rev. 1961).

in four editions (1961, 1962, 1963, 1964). Pub. No. 847.

- The Federal Water Pollution Control Program, 1962." Pub. No. 950.

ution control." Bib. series No. 22. Pub. No. 243.

a series for teachers." No. 1 Pub. No. 958 - 1962.

cations." (Relating to Undesirable Effects Upon Aquatic Life - Algicides,
Pub. No. 400 - 1958.

States." Pub. No. 64 - 1951.

Action Through Environmental Study. Statewide Organizations in Cooperation
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tion." The Association. New York. 1957.

regulations covering public swimming pools." The Association. New York.

guide." U. S. Public Health Service. Washington, D.C. 1962.

Public Health Service. Washington, D. C. 1964.

United States. "The big water fight - trials and triumphs in citizen action
tion, floods, and planning across the U.S.A." Brattleboro, Vermont. S.

National Academy of Sciences. "Waste management and control." Washington, D. C. National Academy of Sciences. 1966.

National Agency for International Publications. "Basic safety standards for radiation protection." New York. The Agency. 1967.

National Commission on Community Health Services. "Changing environmental hazards." Washington. Public Affairs Press. 1967.

New York State Department of Health, 84 Holland Ave., Albany, New York 12208.

Division of Air Resources, 84 Holland Ave., Albany, New York 12208

Division of Pure Waters, 84 Holland Ave., Albany, New York 12208

Division of General Engineering and Radiological Health - This division is divided into five bureaus, each of which is located at 845 Central Ave., Albany, New York 12208

Bureau of Food and Recreation Sanitation

Bureau of Hospital and Institutional Engineering

Bureau of Radiological Health

Bureau of Solid Wastes, Engineering, and Community Environmental Health

Bureau of Rodent, Insect, and Weed Control

"Report of task force in environmental health and related problems - a strategy for a livable environment." U. S. Department of Health, Education, and Welfare, Washington, D.C. June, 1967.

Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021.

"Study of needs for sewage works. report no. 3. Oct. 1962. Constructing economical sewage treatment plants for municipal officials." Office for Local Government, State of New York.

"The next ten years in space." Staff report of the select committee on astronautics and aeronautics. U. S. Government Printing Office. 1959.

"Air pollution." University of the State of New York, The State Education Department, The State Education Development Center, Albany, New York. 1966.

"Water pollution." University of the State of New York, The State Education Department, The State Education Development Center, Albany, New York. 1967.

U. S. Department of Health, Education, and Welfare, Public Health Service, Washington, D.C.

"Waste management and control." Washington, D. C. National Academy of

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of Food and Recreation Sanitation

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of Rodent, Insect, and Weed Control

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